On the Relationship Between Gender Nonconformity and Mental Health:

The Significance of Moderating, Mediating, and Protective Factors.

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Tobias Christoph Issler

aus Lörrach

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Dekan:

Prof. Dr. Axel Mecklinger

BerichterstatterInnen:

Prof. Dr. Tanja Michael, Universität des Saarlandes

Priv.-Doz. Dr. Nicolas Becker, Universität des Saarlandes

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General Abstract

Research shows a correlation between gender nonconformity (GNC) and mental health problems, but there is heterogeneity between studies and several factors influencing this relationship are discussed. The present thesis comprises three studies aimed to enhance the understanding of GNC's relationship to mental health and to identify influencing factors.

Study 1 examined GNC's link to mental health and sought to identify moderating factors using a meta-analysis. Elevated GNC was correlated with increased mental distress, *M(r)* = .09, 95% CI [.06, .12], but not to other mental health outcomes. GNC's operationalization significantly influenced the correlation's direction, while Hofstede's cultural dimensions, nation-level gender equality, and the sample's ethnic composition moderated its magnitude.

Studies 2 and 3 demonstrated a mediating effect of childhood maltreatment (CM) on the relationship between childhood GNC and adult mental health problems, emphasizing its importance. Study 3 further highlighted the protective role of sense of coherence (SOC) in this model, with greater SOC attenuating the association between CM and mental health problems.

The current thesis suggests a small to moderate association between GNC and mental distress. The direction is influenced by the type of GNC measure used, while the magnitude is influenced by cultural and sample-related factors. CM may be a key mechanism in this relationship, whereby SOC might protect from its psychological consequences. Future studies should contribute to the conceptual clarity of GNC, consider the impact of context, and further investigate cultural factors. Prospective studies should examine the importance of CM and SOC in GNC's link to mental health.

Summary

Gender nonconformity (GNC) refers to an individual's deviation from culturally constructed gender norms, roles and stereotypes associated with their biological sex (American Psychological Association [APA], 2015). GNC is a multifaceted construct that encompasses various aspects of experience, behavior and personality (APA, 2012). Several cross-sectional and longitudinal studies suggest that higher levels of GNC may be associated with more mental health problems, as demonstrated for a variety of outcomes related to mental distress (Mahfouda et al., 2023; Narita et al., 2024; Roberts et al., 2013), positive mental health (Toomey et al., 2010), and trans-diagnostic risk factors (Alberse et al., 2019). Although many studies support this hypothesis, there is a degree of heterogeneity between studies, reflected in studies suggesting opposite or no associations (Cook et al., 2013; Jones et al., 2017; Sandfort et al., 2016). To date, it is not clear which factors drive heterogeneity, as there are few studies examining the influence of potential moderating variables. Also, at the beginning of this dissertation project, there was a lack of systematic synthesis and meta-analytic investigation examining this association and its moderating factors.

Theoretical models, such as the Minority Stress Model (Meyer, 2003) or the Integrative Mediation Framework (Hatzenbuehler, 2009), hypothesize that it is not GNC which is the driver of the association with greater mental health problems, but rather psychosocial stressors are the key mechanisms in this association. This hypothesis is supported by several empirical studies finding GNC linked to different kind of stigmatization experiences, like discrimination (Antebi-Gruszka et al., 2022), victimization (van Beusekom et al., 2016), social exclusion (Alanko et al., 2008; Landolt et al., 2004), and childhood maltreatment (Bos et al., 2019). Also, these psychosocial stressors have been found to mediate GNC's relationship with mental health problems, for example, homophobic-peer violence (van Beusekom et al., 2016) or childhood maltreatment (Zhao et al., 2021). Specifically CM may be a relevant mediator in this association, as it has life-long effects on psychological, emotional, and social well-being impacting the mental health of affected individuals (Pfaltz et al., 2022).

Furthermore, protective factors on the relationship between GNC and mental health have received little attention. Societal interventions seem promising because they have the potential to

reduce prejudice and thus probability of stigmatization experiences for gender nonconforming

individuals (Cramwinckel et al., 2018; Truszczynski et al., 2022). However, as societal changes require

sufficient time and might have less potential to influence the psychological effects of stigmatization

which has already occured. Accordingly, research should also focus in individuals interventions and

protective factors which could buffer effects of occured stigmatization experiences. Sense of

coherence (SOC) might be promising resilience factor. A high sense of coherence is associated with a

sense that the world is understandable, meaningful and manageable (Mittelmark et al., 2022).

Empirical studies suggest that a strong sense of coherence can help individuals cope with

psychosocial stress (Schäfer et al., 2020, Schäfer, Sopp et al., 2022; van der Hal-van Raalte et al.,

2008). Therefore, a strong SOC might also help mitigate the effects of stigmatization, including in

gender-nonconforming individuals, who often experience abuse.

This dissertation aims to advance knowledge of the relationship between GNC and mental

health by synthesizing previous evidence and identifying potential moderators, mediators, and

protective factors that influence this relationship. Therefore, this dissertation comprises three

studies, which examine this objective using different methods and in different samples.

Study 1 aimed to synthesize previous findings on the relationship between GNC and mental

health and to identify moderators of this association. At the outset of this dissertation project, it was

the first meta-analysis to examine this association. A total of 106 primary studies (N = 102,429)

investigating the correlative relationship between GNC and mental health were found (489 effect

estimates). Six random-effects meta-analyses were used to examine the correlation between GNC

and mental distress, self-esteem, well-being, body-image problems and rumination. GNC was

significantely linked to increased mental distress, $M(r)$ = .09, 95% CI [.06, .12], while other meta-

analyses did not indicate a significant correlation. Moderator analyses revealed that GNC measure

type moderated the direction of the relationship for mental distress and self-esteem. Behavior-based

and mixed GNC measures were associated with poorer mental health, whereas personality-based

GNC measures were more likely to be associated with better mental health. These findings underline

the importance of the operationalization of GNC for the between-study heterogeneity in primary

studies. Cultural and individual factors further moderated the strength of the relationship. With stronger correlations in cultures with more restrictive gender norms or in which deviance from these norms was perceived as dangerous. In addition, the relationship was weaker in samples with greater proportions of Caucasian or White participants, whereas it was stronger in samples with greater proportions of African American or Black individuals. These findings suggest a cumulative effect of minority stressors in African American or Black individuals, as supported by empirical studies (Ghavami et al., 2020) and hypothesized by the intersectionality approach (Holley et al., 2016).

Study 2 and 3 focused on the importance of CM as mediator of the relationship between GNC and mental health. In this context, CM could be understood as a form of stigmatization that could increase vulnerability to mental health problems among gender-nonconforming individuals.

Study 2 was the first study to examine this relationship in a (German) psychotherapy outpatient sample. Previous studies have mainly focused on samples from the general population or sexual minority groups. From a clinical-psychological point of view, however, it seems interesting to examine whether this relationship also holds in clinical samples. Therefore, a sample of 75 German psychotherapy outpatients was analyzed to examine the meditative role of CM in the relationship between childhood GNC (CGNC) and psychological distress in adulthood. Elevated CGNC was significantly associated with heightened psychological distress, $r = -.43$, as well as more CM, $r = -.45$. CM partially mediated the relationship between GNC and psychological distress, highlighting the importance of CM as a key mechanism driving this association in gender-nonconforming psychotherapy patients.

Study 3 examined this model in a sample of 371 German cisgender men, that is, individuals who were born biologically and identify as men. CGNC was significantly correlated with CM, $r = .22$, as well as with adult mental health problems, that is, depressive symptoms, $r = .28$, suicidal behavior, $r = .23$, and feelings of loneliness, $r = .23$. CM partially mediated the relationship between CGCN and adult mental health problems, strengthening the hypothesis that CM is a relevant driving factor in this association. Study 3 further examined the buffering effect of SOC this relationship. The findings support the notion that SOC may be protecitve factor, as elevated levels of SOC were associated with

weaker correalations between CM and depressive symptoms as well as current suicidal behavior. However, these findings are preliminary and further research is needed to investigate the protective effect in more detail.

Overall, the results of this dissertation project support the hypothesis of a relationship between GNC and mental health, particularly mental distress. However, this relationship appears to be more complex than originally thought. Cultural, individual, and methodological factors influence the magnitude and direction of this relationship. Accordingly, future studies should contribute to understanding how different aspects of GNC are associated with stigmatization and, in turn, with mental health. In addition, future studies should consider contextual factors when interpreting their findings, and further investigation of the impact of cultural factors is needed. Studies 2 and 3 highlight the importance of CM as a key mechanism in the relationship between GNC and mental health problems in adulthood. Future studies are needed that examine this relationship prospectively and consider additional mediating factors, such as experiences of discrimination or internalization of prejudice. Finally, the results of this thesis highlight the importance of SOC as a protective factor in the relationship between GNC and adult mental health problems. Future studies should further examine the buffering role of SOC and its components, which could be a first step for the development of group-specific individual interventions.

Allgemeine Kurzzusammenfassung

Studien legen einen Zusammenhang zwischen Geschlechtsrollen-Nonkonformität (GNC) und psychischen Problemen nahe. Die Befundlage ist jedoch heterogen und mehrere Faktoren scheinen diese Beziehung zu beeinflussen. Die vorliegende Arbeit umfasst drei Studien, die darauf abzielen, das Verständnis des Zusammenhanges zwischen GNC und psychischer Gesundheit zu vertiefen.

Studie 1 untersuchte meta-analytisch den Zusammenhang zwischen GNC und psychischer Gesundheit zu und identifizierte relevante moderierende Faktoren. GNC korrelierte mit einer erhöhten mentalen Belastung, *M(r)* = .09, 95% CI [.06, .12], jedoch nicht mit anderen Outcomes psychischer Gesundheit. Die Operationalisierung von GRN hat einen signifikanten Einfluss auf die Richtung der Korrelation, während die Kulturdimensionen von Hofstede, die Geschlechter-Gleichstellung auf nationaler Ebene und die ethnische Zusammensetzung der Stichprobe die Stärke der Korrelation beeinflussen.

Die Studien 2 und 3 fanden einen vermittelnden Effekt von Kindesmissbrauch (CM) auf die Beziehung zwischen GNC in der Kindheit und psychischen Gesundheitsproblemen im Erwachsenenalter. Studie 3 unterstrich zudem die schützende Rolle des Kohärenzgefühls (SOC) in diesem Modell, wobei ein höheres SOC den Zusammenhang zwischen CM und psychischen Problemen abschwächte.

Die vorliegende Thesis fand einen geringen bis moderaten Zusammenhang zwischen GNC und mentaler Belastung hin. Das verwendete GNC-Maß beeinflusst die Richtung des Zusammenhanges, während die Stärke von kulturellen und stichprobenbezogenen Faktoren abhängt. CM könnte ein Schlüsselmechanismus in dieser Beziehung darstellen, wobei SOC vor dessen psychologischen Folgen schützen könnte. Künftige Studien sollten zur konzeptionellen Klarheit von GNC beitragen, den Einfluss kultureller Faktoren weiter untersuchen und berücksichtigen. Prospektive Studien sollten die Bedeutung von CM und SOC für den Zusammenhang zwischen GNC und psychischer Gesundheit weiter untersuchen.

Zusammenfassung

Geschlechtsrollen-Nonkonformität (GNC) bezieht sich auf die Abweichung einer Person von kulturell Geschlechternormen, -rollen und -stereotypen, die mit dem biologischen Geschlecht eines Individuums assoziiert werden (American Psychological Association [APA], 2015). GNC ist ein vielschichtiges Konstrukt, das verschiedene Aspekte des Erlebens, Verhaltens und der Persönlichkeit umfasst (APA, 2012). Eine wachsende Zahle an Querschnitts- und Längsschnittstudien deutet darauf hin, dass ein höheres Maß an GNC mit mehr psychischen Problemen einhergehen kann, zum Beispiel mit einer höheren mentalen Belastung (Mahfouda et al., 2023; Narita et al., 2024; Roberts et al., 2013), geringerer positiver psychischer Gesundheit (Toomey et al., 2010) und mehr vorhandenen transdiagnostischen Risikofaktoren (Alberse et al., 2019). Obwohl viele Studien diese Hypothese stützen, zeigt sich eine gewisse Heterogenität zwischen den Studien, was sich in gegenteiligen oder fehlenden Assoziationen (Cook et al., 2013; Jones et al., 2017; Sandfort et al., 2016) widerspiegelt. Bislang ist noch nicht ausreichend untersucht worden, welche Faktoren für diese Zwischen-Studien Heterogenität verantwortlich sind. Dies liegt unter anderem daran, dass es an systematischen Untersuchungen zu diesen Einflussfaktoren fehlt. Zu Beginn dieses Dissertationsprojekts gab auch keine systematische Synthese und meta-analytische Untersuchung, die diesen Zusammenhang und seine moderierenden Faktoren untersuchte.

Theoretische Modelle wie das Minoritätenstress Modell (Meyer, 2003) oder das Integrative Mediation Framework (Hatzenbuehler, 2009) stellen die Hypothese auf, dass nicht GNC die ursächlich für den Zusammenhang mit psychischen Problemen ist, sondern dass vielmehr psychosoziale Stressoren die Schlüsselmechanismen für diesen Zusammenhang darstellen. Diese Hypothese wird durch eine Reihe an empirischen Studien gestützt, welche einen Zusammenhang zwischen GNC und verschiedenen Arten von Stigmatisierungserfahrungen, wie Diskriminierung (Antebi-Gruszka et al., 2022), Viktimisierung (van Beusekom et al., 2016), sozialer Ausgrenzung (Alanko et al., 2008; Landolt et al., 2004) und Misshandlung in der Kindheit (Baams, 2018; Bos et al., 2019, Zhao et al., 2021), fanden. Außerdem wurde gezeigt, dass diese psychosozialen Stressoren die Beziehung zwischen GNC und psychischen Gesundheitsproblemen vermitteln, z. B. Gewalt durch homophobe Gleichaltrige (van

Beusekom et al., 2016) oder Missbrauch in der Kindheit (CM; Bos et al., 2019, Plöderl & Fartacek, 2009; Zhao et al., 2021). Insbesondere CM könnte ein relevanter Vermittler in diesem Zusammenhang sein, da er bekannterweise eine lebenslange Auswirkungen auf das psychologische, emotionale und soziale Wohlbefinden von Betroffenen hat, die sich wiederum auf die psychische Gesundheit auswirken können (Pfaltz et al., 2022).

Darüber hinaus hat die bisherige Forschung nur wenig Aufmerksamkeit auf die Untersuchung von schützenden Faktoren in diesem Zusammenhang gelegt. Gesellschaftliche Interventionen scheinen vielversprechend, da sie das Potenzial haben, Vorurteile und damit die Wahrscheinlichkeit von Stigmatisierungserfahrungen für geschlechtsrollen-nonkonforme Personen zu reduzieren (Cramwinckel et al., 2018; Truszczynski et al., 2022). Allerdings benötigen diese Veränderungen ausreichend Zeit und haben weniger Potenzial, die psychologischen Auswirkungen bereits erfolgter Stigmatisierung zu beeinflussen. Dementsprechend sollte sich die Forschung auch auf individuelle Interventionen und Schutzfaktoren konzentrieren, die die Auswirkungen bereits erfolgter Stigmatisierungserfahrungen abfedern könnten. Das Kohärenzgefühl (SOC) könnte ein vielversprechender Schutzfaktor in diesem Kontext sein. Ein hohes SOC ist mit dem Gefühl verbunden, dass die Welt verständlich, sinnvoll und handhabbar ist (Mittelmark et al., 2022). Empirische Studien deuten darauf hin, dass ein starkes SOC Menschen dabei helfen kann, psychosozialen Stress zu bewältigen (Schäfer et al., 2020, Schäfer, Sopp et al., 2022; van der Hal-van Raalte et al., 2008). Daher könnte ein starkes SOC auch dazu beitragen, die Auswirkungen von Stigmatisierung, wie beispielsweise CM, bei geschlechtrollen-nonkonformen Personen abzumildern.

Diese Dissertation zielt darauf ab, das Wissen über die Beziehung zwischen GNC und psychischer Gesundheit zu erweitern, indem sie die bisherigen Erkenntnisse zusammenfasst und potenzielle Moderatoren, Mediatoren und Schutzfaktoren in dieser Beziehung untersucht. Hierzu wurden drei Studien durchgeführt, welche das Ziel hatten, diese Fragestellung mit unterschiedlichen Methoden und in unterschiedlichen Stichproben zu untersuchen.

Studie 1 hatte zum Ziel, die bisherigen Erkenntnisse über den Zusammenhang zwischen GNC und psychischer Gesundheit zusammenzufassen und Moderatoren dieses Zusammenhangs zu

identifizieren. Zu Beginn dieses Dissertationsprojekts war dies die erste Meta-Analyse, die diesen Zusammenhang untersuchte. Insgesamt wurden 106 Primärstudien (N = 102.429) gefunden, die den korrelativen Zusammenhang zwischen GNC und psychischer Gesundheit untersuchten (489 Effektschätzern). In sechs random-effects Meta-Analysen wurde der Zusammenhang zwischen GNC und mentaler Belastung, Selbstwertgefühl, Wohlbefinden, Körperbildproblemen und Grübeln untersucht. GNC stand in signifikantem Zusammenhang mit erhöhter mentaler Belastung, *M(r)* = .09, 95% CI [.06, .12], während andere Meta-Analysen keine signifikante Zusammenhänge ergaben. Die anschließenden Moderatoranalysen ergaben, dass die Art des GNC-Maßes die Richtung des Zusammenhangs zwischen mentaler Belastung und Selbstwertgefühl beeinflusste. Verhaltensbasierte und gemischte GNC-Maße korrelierten mit einer schlechteren psychischen Gesundheit, während persönlichkeitsbasierte GNC-Maße eher mit besseren psychischen Gesundheit assoziiert waren. Diese Ergebnisse unterstreichen die Bedeutung der Operationalisierung von GNC für die Heterogenität zwischen den Primärstudien. Kulturelle und individuelle Faktoren moderierten hingegen die Stärke der Beziehung. Stärkere Korrelationen wurden in Kulturen gefunden, welche restriktivere Geschlechternormen aufweisen oder in Kulturen, in denen eine Abweichung von diesen Normen als gefährlich empfunden wurde. Darüber hinaus war die Beziehung in Stichproben mit einem höheren Anteil an kaukasischen oder weißen Probanden schwächer, während sie in Stichproben mit einem höheren Anteil an afroamerikanischen oder schwarzen Individuen stärker ausfielen. Diese Ergebnisse deuten auf eine kumulative Wirkung von Stressoren der Minderheit bei afroamerikanischen oder schwarzen Personen hin, wie es durch empirische Studien (Ghavami et al., 2020) gestützt und durch den Intersektionalitätsansatz (Holley et al., 2016) angenommen wird.

Die Studien 2 und 3 konzentrierten sich auf die Bedeutung von CM als Mediator der Beziehung zwischen GNC und psychischer Gesundheit. In diesem Zusammenhang könnte CM als eine Form von Stigmatisierung verstanden werden, welche die Anfälligkeit für psychische Probleme bei geschlechtsuntypischen Personen erhöhen könnte.

Studie 2 war die erste Studie, die diesen Zusammenhang in einer (deutschen) ambulanten Psychotherapiestichprobe untersuchte. Bisherige Studien haben sich hauptsächlich auf Stichproben

aus der Allgemeinbevölkerung oder aus sexuellen Minderheiten konzentriert. Aus klinisch-psychologischer Sicht erscheint es jedoch interessant, zu untersuchen, ob dieser Zusammenhang auch in klinischen Stichproben besteht. Daher wurde eine Stichprobe von 75 deutschen ambulanten Psychotherapiepatienten analysiert, um die meditative Rolle von CM in der Beziehung zwischen GNC in der Kindheit (CGNC) und psychologischer Belastung im Erwachsenenalter zu untersuchen. Höhere Ausprägungen von CGNC war signifikant mit mehr psychischer Belastung assoziiert, $r = -.43$, sowie häufigerem CM assoziiert, $r = -.45$. CM vermittelte die Beziehung zwischen GNC und psychischer Belastung teilweise, was die Bedeutung von CM als Schlüsselmechanismus hervorhebt.

Studie 3 untersuchte dieses Modell an einer Stichprobe von 371 deutschen cisgeschlechtlichen Männern, d. h. Personen, die biologisch als Männer geboren wurden und sich als solche identifizieren. CGNC korrelierte signifikant mit CM, $r = .22$, sowie mit psychischen Gesundheitsproblemen im Erwachsenenalter, d. h. depressiven Symptomen, $r = .28$, suizidalem Verhalten, $r = .23$, und Einsamkeitsgefühlen, $r = .23$. CM vermittelte teilweise die Beziehung zwischen CGCN und psychischen Gesundheitsproblemen im Erwachsenenalter, was die Hypothese stärkt, dass CM ein relevanter treibender Faktor in diesem Zusammenhang ist. Studie 3 untersuchte ferner die schützende Wirkung von SOC auf diese Beziehung. Die Ergebnisse unterstützen die Annahme, dass SOC ein Schutzfaktor in diesem Kontext darstellen könnte, da erhöhte SOC-Werte mit schwächeren Korrelationen zwischen CM und depressiven Symptomen sowie aktuellem suizidalen Verhalten verbunden waren. Diese Ergebnisse sind jedoch vorläufig, und es sind weitere Untersuchungen erforderlich, um die schützende Wirkung genauer zu untersuchen.

Insgesamt unterstützen die Ergebnisse dieses Dissertationsprojekts die Hypothese eines Zusammenhangs zwischen GNC und psychischer Gesundheit, insbesondere mentaler Belastung. Dieser Zusammenhang scheint jedoch komplexer zu sein als ursprünglich angenommen. Kulturelle, individuelle und methodische Faktoren beeinflussen das Ausmaß und die Richtung dieses Zusammenhangs. Dementsprechend sollten künftige Studien dazu beitragen, zu verstehen, wie verschiedene Aspekte von GNC mit Stigmatisierung und damit mit psychischer Gesundheit in Verbindung stehen. Darüber hinaus sollten künftige Studien bei der Interpretation ihrer Ergebnisse

kontextbezogene Faktoren berücksichtigen, und es ist eine weitere Untersuchung der Auswirkungen kultureller Faktoren erforderlich. Die Studien 2 und 3 unterstreichen die Bedeutung von CM als Schlüsselmechanismus in der Beziehung zwischen CGNC und psychischen Gesundheitsproblemen im Erwachsenenalter. Künftige Studien sollten diese Beziehung prospektiv untersuchen und zusätzliche vermittelnde Faktoren wie Diskriminierungserfahrungen oder die Verinnerlichung von Vorurteilen berücksichtigen. Schließlich unterstreichen die Ergebnisse dieser Arbeit die Bedeutung von SOC als Schutzfaktor in der Beziehung zwischen GNC und psychischen Problemen im Erwachsenenalter. Zukünftige Studien sollten die schützende Rolle des SOC und seiner Komponenten weiter untersuchen, was ein erster Schritt für die Entwicklung gruppenspezifischer individueller Interventionen sein könnte.

List of Manuscripts

This dissertation is based on three manuscripts that are previously published, submitted, or in preparation for submission to international peer-reviewed journals. The author is the first author of all manuscripts, which are presented in their original published/submitted form with minor formatting adjustments (e.g., figure laberling, references). As the manuscripts form the core of this cumulative dissertation, overlap in content with the introduction, theoretical background and discussion sections may occur.

Study 1

Issler, T. C., Michael, T., Bédier, A., Dilhuit, S., & Schäfer, S. (2025). The Relationship Between Gender Nonconformity and Mental Health: A Systematic Review and Meta-Analysis. In preparation. Preprint available: Issler, T. C., Michael, T., Bédier, A., Dilhuit, S., & Schäfer, S. (2023). *The Relationship Between Gender Nonconformity and Mental Health: A Systematic Review and Meta-Analysis.* OSF. https://doi.org/10.31219/osf.io/spzm9

Study 2

Issler, T. C., Schäfer, S. K., Sopp, M. R., Schäfer, C., Equit, M., & Michael, T. (2025). The Relationship Between Childhood Gender Nonconformity, Childhood Maltreatment, and Psychological Distress in an Outpatient Sample. Submitted for publication in *Archives of Sexual Behavior*.

Study 3

Issler, T. C., Ferreira de Sá, D., Michael, T., & Schäfer, S. K. (2023). The relationship between childhood gender nonconformity, aversive childhood experiences, and mental health in heterosexual and non-heterosexual cisgender men: The buffering effect of sense of coherence. *Stress and Health*, *39*(4), 782-797. https://doi.org/10.1002/smi.3227

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List of Abbreviations

3PSM	3-Parameter-Selection-Model
ACEs	Aversive childhood experiences
AIC	Akaike information criterion
BIC	Bayesian information criterion
BSI	Brief Symptom Inventory
BSRI	Bem Sex Role Inventory
CGNC	Childhood gender nonconformity
CGNCS	The Childhood Gender Nonconformity Scale
CI	Confidence interval
CM	Childhood maltreatment
CTQ	Childhood Trauma Questionnaire
GGI	Global Gender Gap Index
GNC	Gender nonconformity
GSI	Global severity index
FIML	Full information maximum likelihood
ICAST-R	ISPCAN Child Abuse Screening Tools Retrospective
IMM	Index of Moderated Mediation
LRT	Likelihood ratio test
NIH	National Institute of Health
PEESE	Precision-effect estimate with standard errors
PET-PEESE	Precision-effect test and precision-effect estimate with standard errors
PHQ-9	Patient Health Questionnaire-9
PI	Prediction interval
SBQ-R	Suicidal Behavior Questionnaire-Revised
SIGI	Social Institutes and Gender Index
SOC	Sense of Coherence
TGNC	Transgender and gender-nonconforming

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1   General Introduction

Gender nonconformity (GNC), defined as behaviors, interests, or personality traits that deviate from societal expectations associated with one's biological sex (American Psychological Association [APA], 2015), has increasingly been recognized as a potential risk factor for mental health problems (e.g., Roberts et al., 2013). Numerous cross-sectional and longitudinal studies have reported that elevated levels of GNC are associated with a range of adverse outcomes, including increased levels of mental distress (Alanko et al., 2008; Chan, 2022; Mahfouda et al., 2023; Narita et al., 2024; Roberts et al., 2013), lower levels of positive mental health (Rieger & Savin-Williams, 2012; Toomey et al., 2010), and elevated transdiagnostic risk factors (Alberse et al., 2019; Menon et al., 2013).

However, theoretical models (Hatzenbuehler, 2009; Martin-Storey, 2016; Meyer, 2003) and empirical research (Narita et al., 2024; Roberts et al., 2013; Timmins et al., 2020) suggest that GNC itself is not the causal factor in these associations. Rather, social and societal influences—including discrimination, victimization, and social exclusion—are widely regarded as the primary mechanisms driving these mental health disparities (Hatzenbuehler, 2009; Martin-Storey, 2016; Meyer, 2003). Individuals with higher levels of GNC or who are perceived as GNC often face stigmatization across various areas of life (Antebi-Gruszka et al., 2022; Baams, 2018; Bos et al., 2019; Ghavami et al., 2020), stemming from prejudice not only against GNC itself but also against homosexuality (Skidmore et al., 2006; van Beusekom et al., 2018). These chronic psychosocial stressors can have a significant impact on mental health and overall well-being (Narita et al., 2024; Plöderl & Fartacek, 2009; Roberts et al., 2013; Warren et al., 2022; Zhao et al., 2021). Among these stressors, childhood maltreatment (CM) is particularly prevalent and harmful. Given its profound and long-lasting effects on emotional, social, and psychological development (Pfaltz et al., 2022), CM may serve as a key mediating factor in the development of mental health problems in gender-nonconforming individuals (Bos et al., 2019; Plöderl & Fartacek, 2009, Roberts et al., 2013; Warren et al., 2022).

To better understand the complexity of this relationship, it is essential to examine not only the overall strength of the association between GNC and mental health but also the mediating, moderating, and protective factors that may influence it. Such insights may help identify for whom, under what conditions, and through which mechanisms GNC becomes a risk factor for mental health—or, conversely, how it can be buffered by resilience-promoting factors.

Nonetheless, there are several limitations in the current state of research. Existing studies display a considerable degree of heterogeneity, and it remains unclear which factors contribute to this variation. To date, only limited systematic research has explored these potential moderators. It is plausible that cultural, sample-specific, and methodological factors significantly shape the observed associations.

Therefore, a comprehensive synthesis of existing research, along with systematic investigation of potential influencing factors, is required. In particular, cultural and social contexts appear to shape both gender norms and stigmatization processes (Spence & Helmreich, 1978), and thereby influence the relationship between GNC and mental health outcomes (Zentner & von Aufsess, 2022). As most studies to date have been conducted on the North American continent, particularly in the United States (e.g., Feinstein et al., 2012; Mustanski & Liu, 2013; Pachankis & Goldfried, 2006; Rosario et al., 2022; Toomey et al., 2010), the generalizability of these findings to other cultural contexts remains uncertain. This raises important questions about whether similar patterns can be observed in countries such as Germany.

In addition, the literature has so far paid relatively little attention to protective factors that may buffer against the negative effects of GNC-related stigmatization. There is a growing need for research that investigates resilience-enhancing mechanisms—such as internal coping resources—and their potential to mitigate the psychological consequences of stigmatization.

This dissertation aims to address these research gaps through three interrelated studies:

1. Study 1 examines the relationship between GNC and mental health across different countries and populations and explores the influence of cultural, individual, and

methodological factors on the magnitude and direction of this relationship through a systematic review and meta-analysis.

2. Study 2 seeks to replicate previous findings on the mediating role of childhood maltreatment in a German outpatient psychotherapy sample, thereby extending research to a clinical, non-U.S. context.

3. Study 3 investigates the protective role of the sense of coherence (SOC), testing whether SOC can buffer the negative mental health effects of stigmatization and childhood maltreatment among gender-nonconforming individuals.

The following chapters provide a comprehensive framework for this dissertation. Chapter 2 outlines the theoretical background and rationale of this thesis, presenting central concepts and theoretical models hat inform this research, and summarizes the research gaps and aims. Chapter 3-5 contain the manuscripts to the three individual studies. Chapter 6 integrates and discusses the global findings, evaluates the methodological limitations, outlines implications for future research, and concludes with final reflections.

By addressing these objectives, this dissertation aims to advance the understanding of how GNC is related to mental health, identify mechanisms of vulnerability and resilience, and contribute to the development of prevention and intervention strategies supporting mental well-being in gender-nonconforming individuals in diverse cultures and populations.

2 Background and Rationale

2.1 Gender Nonconformity: Definition and Conceptualization

GNC can be understood as an individual's deviation from culture-specific gender norms, roles and stereotypes traditionally associated with their biological sex (APA, 2015). Biological sex, also known as assigned gender, encompasses physical, anatomical, and hormonal characteristics, including primary and secondary sexual organs (APA, 2012). In contrast, gender norms, roles and stereotypes refer to social expectations regarding how individuals should behave, express themselves, and interact based on their biological sex (Cislaghi & Heise, 2020; Zucker et al., 2006). These social expectations affect various aspects of an individual's life, including clothing, career choices, hobbies, linguistic expressions or interpersonal behavior (Bem, 1974; Lippa, 1991; Zucker et al., 2006). Individuals are perceived as gender nonconforming when they deviate from these expectations (APA, 2012). For example, a man who wears a skirt or makeup may be viewed as gender nonconforming (Zucker et al., 2006), just as woman displaying high levels of competitiveness (Bem, 1974; Helmreich et al., 1981). Therefore, GNC is a complex construct, which encompasses various visible and non-visible aspects of behavior, experience and personality. However, what is considered as GNC is influenced by social context and historical factors as gender norms, roles and stereotypes can change over time and differ between cultures (Holt & Ellis, 1998; Zhang et al., 2001). These changes might shape the societal perceptions of acceptable gender expressions. Additionally, gender nonconforming is also used as an identity label by individuals who experience a deviation from their biological sex, most commonly referred to as *transgender and gender nonconforming* (TGNC; APA, 2015; Austin, 2016). Thus, GNC can be understood both as an attribute or an identity label.

In this dissertation, GNC is conceptualized as a continuous attribute, which is present on a spectrum, with varying degrees present in all individuals (Rieger et al., 2008; Zucker et al., 2006). Therefore, GNC reflects a range from low to high GNC, recognizing that most individuals exhibit some degree of deviation from traditional gender norms.

2.2   Gender Nonconformity and Mental Health

A growing body of longitudinal and cross-sectional empirical studies indicate that gender-nonconforming individuals report worse mental health compared to their gender-conforming counterparts, which is evident in several outcomes of mental distress, positive mental health as well as for transdiagnostic risk factors. For example, associations have been found between higher levels of GNC and greater psychological distress (Alanko et al., 2008; Mahfouda et al., 2023; van Beusekom et al., 2018), more symptoms of depression (Chan, 2022; Folkierska-Żukowska et al., 2022), poorer well-being (Rieger & Savin-Williams, 2012), reduced life satisfaction (Toomey et al., 2010), and lower self-esteem (Alberse et al., 2019; Menon et al., 2013; Rijn et al., 2013).

Even though many studies support these findings, others indicate a more complex pattern. For example, no associations were found between GNC and symptoms of depression (Cook et al., 2013; Sandfort et al., 2016) and anxiety disorders (Sandfort et al., 2016) in two South African samples. Similarly, no significant association was found between GNC in childhood (CGNC) and a later anxiety disorder diagnosis in a UK sample (Jones et al., 2017). However, the reasons for this between-study heterogeneity have not yet been systematically investigated.

2.3   Factors Influencing on the Relationship between Gender Nonconformity and Mental Health

To gain a deeper insight on the relationship between GNC and mental health as well as the between-study heterogeneity found, it seems important to understand the underlying driving factors (mediating factors) on the one hand and to identify factors that influence the relationship (moderating factors) on the other. Finally, the question arises as to which factors might have a protective influence on the relationship (protective factors).

2.3.1   Mediating Factors: The Importance of Prejudice, Stigmatization and Victimization

Previous models and studies on the driving factors of the relationship between GNC and mental health primarily emphasize the mediating role of psychosocial stressors, stemming from prejudices and stigmatization of GNC. These assumptions are summarized, for example, in the Minority Stress Model (Meyer, 2003) and its extensions, such as the Integrative Mediation

Framework Model (Hatzenbuehler, 2009), and are backed up by empirical evidence (e.g., Baams et al., 2013; Chan, 2022; Timmins et al., 2020; van Beusekom et al., 2016).

2.3.1.1 Minority Stress Model

The Minority Stress Model (Meyer, 2003) assumes that experiences of stigmatization related to minority status, such as sexual minority status or GNC (distal prejudice events; Meyer, 2003), can activate several processes that have the potential to increase the vulnerability for mental health problems. These processes include, among others, the internalization of these prejudices and norms (so-called proximal prejudice events, e.g. internalized homophobia or internalized heterosexism) as well as changes in behavior (e.g. concealment of characteristics associated with minority status). These changes resulting from experiences of stigmatization are thought to increase susceptibility to mental health problems in minority groups as they are additional (group-specific) stressors. Although the model was originally developed to explain mental health disparities in sexual minorities, i.e. people who do not identify as heterosexual (Plöderl et al., 2017), these assumptions may also be translated to GNC as there is a complex relationship between GNC and homosexuality (see 2.3.1.2).

2.3.1.2 Overlaps between Prejudice Against GNC and Homosexuality

Understanding prejudice against GNC requires examining its intersection with prejudice against homosexuality, as there is a complex relationship between both constructs. Several studies suggest that, on average, sexual minorities display higher levels of GNC compared to their heterosexual counterparts (Bailey & Zucker, 1995; Lippa, 2008). In addition, GNC in childhood (CGNC) has been associated with later identification as sexual minority (Li et al., 2017). However, while there is a correlation, GNC is not a definitive predictor of sexual orientation. While some children who display gender-nonconforming behavior go on to identify as sexual minorities, this is not universally the case; likewise, many gender-conforming individuals identify as sexual minorities in adulthood (Lippa, 2008; Rieger et al., 2008).

Nonetheless, individuals with higher GNC are often perceived as sexual minorities due to their gender expression (Baams et al., 2013). As a result, they frequently become targets for

homophobic stigmatization (Skidmore et al., 2006) and homophobic bullying (D'haese et al., 2016, van Beusekom et al., 2018, 2020), regardless of the individual's actual sexual orientation (Skidmore et al., 2006; van Beusekom et al., 2020). These findings highlight the role of GNC as an important factor contributing to the poorer mental health of sexual minorities, as it is - in contrast to actual sexual orientation - a (partially) visible characteristic (Rieger & Savin-Williams, 2012; Skidmore et al., 2006).

The intersections of GNC and perceived sexual orientation has significant implication for mental health. Research suggests that the mental health disparities observed among sexual minorities are better predicted by GNC or GNC-related harassment than by sexual orientation itself (Martin-Storey & August, 2016; Rieger & Savin-Williams, 2012). Similarly, gender-nonconforming sexual minorities experience more victimization than their gender-conforming counterparts (D'haese et al., 2016). Overall, the findings suggest a close but complex link between GNC and homosexuality, which is also reflected in prejudice and stigmatization.

2.3.1.3   Integrative Mediation Framework Model

The Integrative Mediation Framework (Hatzenbuehler, 2009) extends the assumptions of the minority stress model by including general psychological processes that also affect the mental health of (sexual) minorities. These include cognitive, affective and social risk factors, such as hopelessness, rumination, emotion regulation problems or social isolation. While the Minority Stress Model focuses primarily on group-specific processes (e.g. stigmatization and its consequences), the Integrative Mediation Framework takes into account both group-specific and general psychological processes. What both models have in common is that they assume that it is not the minority status itself, such as higher levels of GNC, that is the cause of psychological problems, but rather psychosocial stressors such as social stigmatization and its consequences.

2.3.1.4   Empirical Evidence

The assumptions of these models are supported by extensive empirical research across various countries. Studies indicate that individuals with higher levels of GNC report more frequent

experiences of stigmatization, including victimization (Chan, 2022; van Beusekom et al., 2016), discrimination (Antebi-Gruszka et al., 2022; Ghavami et al., 2020), childhood maltreatment (Baams, 2018; Bos et al., 2019; Plöderl & Fartacek, 2009; Zhao et al., 2021), and social rejection. Specifically, gender nonconforming individuals face rejection from parents (Alanko et al., 2008; Landolt et al., 2004), peers (MacMullin et al., 2021) and teachers (Chan, 2022) as well as broader social exclusion (Martin-Storey & August, 2016). Meta-analyses estimate a small but significant positive association between GNC and experiences of victimization (Hu et al., 2023; Thoma et al., 2021). These psychosocial stressors are found to mediate the relationship between GNC and mental health cross-sectional studies (e.g., Baams et al., 2013; Chan, 2022, van Beusekom et al., 2016) and could explain a large proportion of the variance in this relationship in longitudinal studies (Narita et al., 2024; Roberts et al., 2013).

The consequences of stigmatization manifest both directly and indirectly. For example, childhood maltreatment has been linked to increased allostatic load, impaired attachment patterns, and social functioning deficits, all of which heighten vulnerability to mental health problems (Pfaltz et al., 2022). These mechanisms may partially explain findings linking GNC to attachment difficulties (Landolt et al., 2004), rejection sensitivity, and social anxiety (Feinstein et al., 2012).

Beyond direct experiences of stigmatization, the expectation of stigmatization and rejection emerges as a further stressor influencing mental health (Puckett et al., 2016, Narita et al., 2024, Roberts et al., 2013). Some evidence suggests that anticipated stigmatization may be more relevant than other minority stressors. For instance, Puckett et al. (2016) found that the impact of anticipated stigmatization was the only significant path in a parallel mediation model including other minority stressors, such as direct experiences of stigmatization. Anticipated stigmatization may increase the persistent social pressure to conform to gender norms leading to more perceived stress, as postulated by the gender role discrepancy model (Reidy, Kernsmith et al., 2018; Reidy, Smith-Darden et al., 2018). Furthermore, the concealment of GNC-related identity aspects and the internalization

of prejudice and gender norms – such as internalized homophobia or heterosexism - can further exacerbate these problems (Timmins et al., 2020; van Beusekom et al., 2018).

Taken together, the cumulative impact of both direct and anticipated experiences of stigmatization and their consequences represent chronic stressors that increase susceptibility to mental health problems (Hatzenbuehler, 2009; Martin-Storey, 2016; Meyer, 2003). However, the relevance of specific mediating processes may vary depending on the psychological outcome examined (Beltz et al., 2021). For example, bullying experiences appear particularly relevant for depressive symptoms (Narita et al., 2024; Roberts et al., 2013), whereas rejection sensitivity may play a more central role in social anxiety symptoms (Feinstein et al., 2012). Similarly, social connectedness and communal relationships have been found to impact self-esteem (Beltz et al., 2021; DiDonato & Berenbaum, 2013). Despite these variations, the unifying mechanism underlying these processes is the central role of prejudice and stigmatization of gender nonconforming individuals. These psychosocial stressors, such as exposure to acute and chronic social stressors – including bullying, repeated social exclusion, and discrimination – may be a significant driver of mental health problems, contributing to both the onset and maintenance of mental health problems (Bjornsson et al., 2020; Grant et al., 2003; LeMoult et al., 2020; Nicholson et al., 2022; Oncioiu et al., 2023).

2.3.1.5   Childhood Maltreatment as a Particular Risk Faktor

Among the various psychosocial stressors associated with GNC, childhood maltreatment (CM) might be a particular salient risk factor. As noted above, individuals with higher levels of CGNC report elevated rates of CM (Bos et al., 2019; Zhao et al., 2021). Given that CM is widely recognized as an important risk factor for mental health problems over the lifespan (Hughes et al., 2017), it is likely to contribute significantly to the heightened mental health problems among individuals with higher levels of CGNC. This is especially concerning given the extensive and enduring consequences of CM, which include an increased risk for various mental and physical health problems (e.g., Baldwin et al., 2023; Hughes et al., 2017; Xiao et al., 2023).

Several mechanisms have been proposed to explain the link between CM and mental health problems. One key pathway involves attachment-related difficulties, which can impair social interactions and alter social processing mechanisms. These disruptions hinder effective social functioning, thereby increasing individuals' vulnerability to mental health problems (Pfaltz et al., 2022). Another critical mechanism is the concept of allostatic load, which refers to the cumulative strain on the body caused by chronic stress and repeated adaptation reactions, represented in several biomarkers such as inflammatory, cardiovascular, and metabolic parameters (Schenk et al., 2018). Allostatic load is associated with mental and physical health problems as well as reduced quality of life (Beckie, 2012) and mediates the association between CM and depression in adulthood (Scheuer et al., 2018). This concept may be particularly relevant for GNC individuals, who not only experience higher rates of CM but also face additional chronic psychosocial stressors, such as discrimination (Antebi-Gruszka et al., 2022) and social exclusion (Chan, 2022), which might further increase their allostatic load. The interplay of these factors likely amplifies their overall stress, increasing their vulnerability to mental health problems.

Previous studies have found a mediating role of CM in the relationship between CGNC and mental health problems (Plöderl & Fartacek, 2009; Zhao et al., 2021). Stigmatization and social prejudices appear to play a central role in this dynamic. One proposed explanation is that caregivers who have negative attitudes or feelings of discomfort about GNC or homosexuality may be more likely to engage in abusive behaviors in an attempt to enforce gender conformity (Bos et al., 2019), which may be particularly true for boys (Kane, 2006; Sandnabba & Ahlberg, 1999). Such maltreatment can have a lasting effect on psychological development, reinforcing patterns of internalized stigmatization and maladaptive coping strategies that persist into adulthood.

In summary, the cumulative effects of CM, discrimination and anticipated stigmatization seem to directly contribute to the heightened mental health problems among gender nonconforming individuals.

2.3.2 Moderating Factors: Factors Influencing the Size of the Relationship Between Gender Nonconformity and Mental Health

Understanding the between-study heterogeneity across studies examining the relationship between GNC and mental health requires analyzing additional moderating factors. While several potential moderators have been discussed in the literature, systematic investigations remain limited. Based on existing explanatory models and previous research, this thesis distinguishes between three categories of moderators: cultural, individual and methodological factors.

2.3.2.1 Cultural Factors

In the present thesis, cultural factors are defined as social, economic, political, or geographical characteristics of a culture. Social context, such as culture, plays a significant role in the development of gender norms, roles, and stereotypes, determining which tasks, rights and privileges are traditionally ascribed to different genders, and how deviations from these are perceived and dealt with (Spence & Helmreich, 1978). Thus, cultural factors may significantly influence the relationship between GNC and mental health by impacting prejudice and stigmatization (Zentner & von Aufsess, 2022).

Several studies have discussed cultural influences on the relationship between GNC and mental health (e.g. Chan, 2022; Cook et al., 2013; Sandfort et al., 2016; Zentner & von Aufsess, 2022), but few studies have systematically investigated these effects. One exception are two international studies that examined the impact of national-level gender equality on the relationship between GNC and self-esteem, finding that as gender equality increased, the negative correlation between GNC and self-esteem weakened (Zentner & von Aufsess, 2022). The authors suggest that deviations from gender roles have a particularly critical impact on mental health when they interact with restrictive gender roles within a culture.

Other cultural characteristics may also moderate this relationship. Hofstede et al.'s (2010) cultural dimensions, for instance, provide a framework for understanding variations in gender norms across societies. Dimensions such as masculinity, uncertainty avoidance, individualism, and

indulgence could influence social attitudes toward GNC and, in turn, mental health for gender-nonconforming individuals.

2.3.2.2 Individual Factors

In the current thesis, individual factors refer to sample characteristics, such as gender, sexual orientation, ethnic identity and the age of the sample, as well as contextual variables like whether participants are drawn from clinical vs. non-clinical populations. These factors may moderate the relationship between GNC and mental health by influencing the rate of stigmatization and discrimination.

A frequently discussed assumption is that prejudices against GNC is more pronounced for men than for women (D'Augelli et al., 2006; Sanborn-Overby & Powlishta, 2020), leading to greater stigmatization among gender-nonconforming men. Several studies support this, showing that men report more experiences of stigmatization (Hu et al., 2023; Thoma et al., 2021) and higher rates of mental health problems compared to women (van Beusekom et al., 2018). However, other studies have found opposite results (Warren et al., 2022) or no difference between men and women (Gordon et al., 2018), highlighting the need for further investigation.

Sexual orientation has also been discussed as moderator. Research indicates that homosexual individuals tend to report higher levels of GNC on average compared to heterosexual samples (Bailey & Zucker, 1995; Li et al., 2017). Therefore, sexual minorities might be at higher risk of stigmatization due to higher levels of GNC (Plöderl & Fartacek, 2009). However, findings remain mixed, with some studies reporting no significant differences in the association between both GNC and stigmatization (Ioerger et al., 2015; Roberts et al., 2013) as well as GNC and mental health problems across sexual orientations (Folkierska-Żukowska et al., 2022; Gordon et al., 2018).

Ethnic identity is another factor that may influence this relationship. Gender norms, roles and stereotypes may vary across subcultures (Lehavot, King, & Simoni, 2011; Moore, 2006) and ethnic minority individuals may experience intersectional minority stress, facing discrimination based on both their ethnic background and gender expression (Ghavami et al., 2020; Holley et al., 2016).

The combined effects of multiple forms of discrimination could further elevate the mental health problem for gender-nonconforming individuals from marginalized ethnic backgrounds.

Overall, these individual factors may explain some of the heterogeneity in study findings and should be carefully considered in future research.

2.3.2.3   Methodological Factors

Beyond cultural and individual influences, methodological factors may also account for variations in the reported correlations between GNC and mental health. In this thesis, methodological factors include the operationalization of GNC and mental health outcomes, the study design, and the statistical analysis.

Given the conceptual complexity of GNC, its operationalization has varied considerably across studies. While some measures focus on behavioral expressions (e.g., clothing preferences or hobbies; Zucker et al., 2006), others assess personality traits related to gender roles (e.g., competitiveness as aspect of masculinity or warmth for feminity; Helmreich, Spence & Wilhelm, 1981). A number of instruments adopt a mixed approach (e.g., Tate et al., 2015), combining behavioral and personality-based items, or include items that cannot be clearly assigned to either domain (Hu et al., 2023). Studies suggest that the relationship between GNC and mental health may vary depending on the GNC measure type used (Lehavot & Simoni, 2011). Moreover, the majority of studies utilize self-report measures (e.g., Alanko et al., 2008; Chan, 2022; Folkierska-Żukowska et al., 2022; Mahfouda et al., 2023; van Beusekom et al., 2018), while only a few employ other person-reports (e.g., Johnson et al., 2004; Jacobson et al., 2016; Skidmore et al., 2006), which may affect the comparability between studies. However, empirical studies suggest a moderate to high correlation between self- and other person-report GNC measures (Rieger et al., 2008; Skidmore et al., 2006). Theses aspects might also translate to the assessment of mental health outcomes, which varied greatly between studies.

In addition, aspects of the study design (e.g., cross-sectional versus longitudinal studies), study characteristic (e.g., publication year or status), or the statistical analysis could also play a

relevant role in between-study heterogeneity. The lack of systematic studies to date makes it impossible to further draw more concrete conclusions on possible methodological problems.

2.3.3 Protective Factors: Approaches to Preventive and Interventional Reduction of the Correlation between Gender Nonconformity and Mental Health

Understanding the factors that can buffer or mitigate the relationship between GNC and mental health is crucial. Given that prejudice and the stigmatization are primary contributors to mental health disparities found, two categories of preventive and interventional measures can be considered: societal-level interventions and individual-level interventions.

Preventive and interventional measures at the societal level aim to reduce prejudice and stigmatization, preventing victimization and its associated mental health consequences. These measures may involve educational programs promoting diversity in schools, workplaces, and other social institutions, particularly interventions that elicit empathy and perspective taking seem promising (Cramwinckel et al., 2018). Legislative measures that enhance protections for gender-nonconforming individuals can also play a significant role in reducing discrimination and fostering a more supportive social environment, for example, TGNC individuals reported less discrimination in U.S. states with greater policy protection (Truszczynski et al., 2022, but see: Clark et al., 2022). However, as societal changes requires sustained, long-term commitment, such interventions alone may not provide immediate relief to individuals currently facing discrimination and mental health problems.

Therefore, individual-level interventions are also necessary to buffer the psychological impact of stigmatization and discrimination. From a clinical-psychological perspective, it is essential to explore how adverse mental health effects of prejudice and stigmatization can be mitigated and how the resilience of affected individuals can be promoted. Despite its significance, this aspect has received limited attention in research on the relationship between GNC and mental health. Some studies have examined protective factors such as social support (Irvin et al., 2023, but see: Logie et al., 2012) and parental acceptance (Folkierska-Żukowska et al., 2022; van Beusekom et al., 2015), but

further exploration is needed to identify effective interventions. One promising approach is resilience, specifically sense of coherence (SOC).

2.3.3.1   The Sense of Coherence as a Protective Factor.

Resilience refers to an individual's ability to maintain or quickly recover mental well-being despite adversity, such as during or after a stressful event or trauma (Kalisch et al., 2017). It is understood as a dynamic adaptation process resulting from the interaction of somatic, psychological and social factors (Wu et al., 2013). These resilience factors protect individuals from the potentially harmful effects of stress by activiating higher-level resilience mechanisms (Kalisch et al., 2015; Schäfer, Kunzler, et al., 2022).

A key resilience factor within this framework is the sense of coherence (SOC), the core construct of the salutogenetic model (Antonovsky, 1979; Schäfer, Kunzler et al., 2022). SOC can be understood as a pervasive and persistent confidence that both internal and external environments are predictable and things will turn out well (Antonovsky, 1979). Individuals with a high SOC interpret their environment as comprehensible, manageable and meaningful (Mittelmark et al., 2022). SOC might be a particular interesting protective factor as it shows the strongest effect compared to related constructs (Grevenstein, Aguilar-Raab, et al., 2016).

SOC is thought to help an individual to stay at the healthy end of the continuum between disease and health (Grevenstein, Aguilar-Raab, et al., 2016) by influencing how they cope with stress and utilize internal and external resources (Idan, Eriksson, et al., 2022). Higher levels of SOC are associated with flexible and adaptive coping, leading to lower levels of psychological distress (Eriksson, 2022). Several meta-analyses have found that SOC is negatively associated with symptoms of depression and anxiety in adulthood (del-Pino-Casado et al., 2019), post-traumatic stress symptoms in adulthood (Schäfer et al., 2019), psychopathology across childhood to young adulthood (Schäfer et al., 2021).

Further support for the protective role of SOC comes from a 1-year prospective study, which demonstrated that higher SOC buffered the negative mental health effects of the COVID-19

pandemic in the German general population (Schäfer et al., 2020; Schäfer, Sopp, et al, 2022).

Additionally, cross-sectional research indicates that SOC can buffer the relationship between

stigmatization and health-related outcomes, with higher SOC linked to better mental and physical

health (Baron-Epel et al., 2017; Noronha et al., 2023). Studies of Holocaust survivors have similarly

shown that SOC moderated the association between childhood traumatization and post-traumatic

stress symptoms, with higher levels of SOC reducing the influence of childhood traumatization on

later post-traumatic stress symptoms (van der Hal-van Raalte et al., 2008). Recent evidence further

supports this buffering role in relation to CM (Fan et al., 2024).

Taken together, these findings suggest that SOC may act as a protective buffer against

negative psychological effects of (chronic) psychosocial stress. As such, interventions aimed to

strengthening SOC could be particularly valueable for individuals exposed to ongoing or past

adversity, such as gender-nonconforming individuals, by enhancing their capacity to cope with stress

and promoting long-term mental health (Chmitorz et al., 2018).

2.4   Summary

An increasing number of longitudinal and cross-sectional studies suggest a correlation

between higher levels of GNC, that is the deviation from expectations associated with the biological

sex (APA, 2012), and worse mental health (e.g., Mahfouda et al., 2023; Narita et al., 2024; Roberts et

al., 2013). However, the findings show a certain degree of between-study heterogeneity, which has

not been systematically investigated yet. Theoretical models and empirical findings suggest, that it is

not GNC that causes poorer mental health, but rather psychosocial stressors, which are caused by

prejudice against and stigmatization of gender-nonconforming individuals (Hatzenbuehler et al.,

2009; Martin-Storey, 2016; Meyer, 2003). This is reflected, among other things, in the findings that

people with higher levels of GNC report more experiences of CM, which is known to have a

significant impact on mental health (Hughes et al., 2017). In order to better protect people with GNC,

there is therefore a need for social measures aimed at reducing prejudice and stigmatization (e.g.,

Cramwinckel et al., 2018; Truszczynski et al., 2022) on the one hand, and interventions at the

individual level to reduce the effects of stigmatization already experienced, such as CM, on the other. One protecting factor on individual level might be SOC, which has found to have a buffering effect on psychosocial stressors (Schäfer et al., 2020; Schäfer, Sopp, et al., 2022; van der Hal-van Raalte et al., 2008).

2.5   Research Gaps

While numerous of cross-sectional and longitudinal studies investigated the relationship between GNC and mental health, inconsistencies in the findings highlight significant gaps in the literature. Existing studies show substantial heterogeneity in their results, showing the need of a systematic synthesis to better understand the factors influencing the relationship between GNC and mental health.

In addition, most research on this topic originates from North America, particularly the United States (e.g., Feinstein et al., 2012; Mustanski & Liu, 2013; Pachankis & Goldfried, 2006; Rosario et al., 2022; Toomey et al., 2010). Although there is a growing number of studies from the European, they are predominantly conducted in the United Kingdom (e.g., Green et al., 2018; Warren et al., 2019; Warren et al., 2022) or the Netherlands (e.g., Baams et al., 2013; Oginni et al., 2019; van Beusekom et al., 2015; van Beusekom et al., 2016; van Beusekom et al., 2018). This seems to be particularly relevant, as social and cultural factors are shaping gender norms, attitudes toward GNC, and the handling of deviations from these (Spence & Helmreich; 1978) and subsequently influence the relationship between GNC and mental health (Zentner & von Aufsess, 2022). Thus, it seems crucial to examine whether findings from earlier studies can be replicated in German samples.

Furthermore, prior research focused on general population samples or sexual minority samples, as they then to report higher levels of GNC. However, the question arises whether these findings can also translate to clinical populations. Do gender-nonconforming psychotherapy patients also report higher psychological distress than their gender-conforming counterparts and, if so, whether this increased distress is also mediated by psychosocial stressors, such as more frequent experiences of CM?

Additionally, previous research has devoted little focus to individual protective factors, which may buffer the negative effects of GNC-related stigmatization. Identifying such protective mechanisms is crucial for developing targeted interventions aimed at mitigating at the psychological impact of these psychosocial stressors.

2.6   Research Question and Aim

To address these research gaps, this dissertation project aimed to investigate mediating, moderating and protective factors in the relationship between GNC and mental health. For this purpose, a systematic review and meta-analysis (Study 1) was conducted to summarize the existing findings on the correlation between GNC and mental health and to examine moderating factors on this association. Second, two field studies were conducted to investigate the importance of CM as a mediating factor (Study 2 and 3) and the potential buffering effect of SOC (Study 3).

Study 1 provides the first systematic research synthesis examing the correlation between GNC and mental health. The meta-analysis aimed to estimate the effect size of the relationsship between GNC and mental health and estimate the influence of cultural, individual, and methodological factors as potential moderators.

Study 2 extends prior research by testing whether findings from non-clinical samples apply to outpatient psychotherapy patients in Germany. Specifically, it examined the relationship between GNC and mental health in a clinical setting and the role of CM as a mediator in this relationship. This is the first study to explore the relationship between CGNC, CM, and psychological distress in a outpatient psychotherapy population.

Study 3 focused on cisgender men, individuals who were born and identify as men (APA, 2015), in the general population. This study aimed to replicate the findings on the relationship between CGNC, CM, and mental health in a German sample as well as assess whether SOC serves as a protective factor buffering the negative impact of CM in this context.

By addressing these research gaps, this dissertation aims to enhance the understanding of GNC as a risk factor for mental health disparities. Through meta-analytic synthesis, cross-cultural

replication, and clinical examination, these studies contribute to a more comprehensive framework

for evaluating the mechanisms influencing the relationship between GNC and mental health.

Furthermore, by exploring protective factors such as SOC, this research may inform future

interventions designed to mitigate the adverse effects of GNC-related stigmatization.

3   Study 1: The Relationship Between Gender Nonconformity and Mental Health: a Systematic Review and Meta-Analysis

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3.1   Abstract

Primary studies on the relationship between gender nonconformity (GNC) and mental health have yielded inconsistent results. This preregistered research synthesis summarizes available evidence on this relationship and identifies potential moderators. We performed six random-effects meta-analyses based on 106 studies (489 effect estimates; *N*=102,429), which revealed a complex pattern of results, with effect estimates ranging from negligible to small, and effect estimates varying in direction and magnitude. Overall, we found greater GNC was linked to increased mental distress, *M(r)*=.09, 95% CI [.06, .12], but no significant relationships were found between GNC and self-esteem, well-being, body image problems, and rumination. How GNC was measured affected the direction of the relationship for mental distress and self-esteem, with behavior-based GNC measures being associated with worse mental health and personality-based GNC measures correlating with better mental health for higher GNC. Cultural factors had an influence on the magnitude of the relationship, with stronger relationships in societies with greater gender equality for personality-based GNC measures and in societies with higher levels of collectivism, uncertainty avoidance, restraint, and long-term orientation for both GNC measures. Overall, the relationship between GNC and mental health is small in magnitude. Differences related to GNC measure types point to a lack of conceptual clarity, with GNC likely being a multicomponent construct. The generalizability of our findings is limited by the focus of primary studies on Western high-income countries. Future research

should improve the conceptual clarity of GNC and instruments measuring GNC, which would allow for an in-depth analysis of cultural contexts.

3.1.1   *Public Significance Statement:*

This preregistered research synthesis highlights a minor link between gender nonconformity (GNC) and mental health, but the association varies in direction and size, depending on the operationalization of GNC and cultural context. Intersectionality such as stigmatization based on ethnic identity might further strengthen the link between GNC and mental health.

3.2   Introduction and Theoretical Background

Sex refers to a person's biological attributes such as physical features, sex chromosomes, and reproductive anatomy (American Psychological Association [APA], 2012), while gender refers to psychological aspects such as stereotypes and norms that a culture associates with a person's biological sex (APA, 2012). Gender nonconformity (GNC) can be understood as the degree to which a person diverges from culture-specific expectations such as gender roles and stereotypes associated with the assigned gender for their biological sex (APA, 2015). It represents a multifaceted construct that includes both the visible and non-visible characteristics as well as aspects of personality, experience (e.g., gender identity) and behavior (e.g., gender expression). GNC can also be understood as both an attribute of a person and an identity label. The construct GNC is manifold, and so, too, are the terms used to refer to it, including gender atypical, gender expansive, or cross-gender behavior. For this review, we considered GNC to be an attribute expressed on a continuum ranging from low to high nonconformity.

At the behavioral level, GNC can manifest, for example, in the adoption of other-gender roles in childhood fantasy games, a preference for clothing and interests traditionally associated with another gender than the assigned one, or a preference for other-gender peers (Zucker et al., 2006). Displaying personality aspects that are perceived as untypical for the assigned gender can also be understood as GNC (e.g., Zentner & von Aufsess, 2022). Most models adopt a binary approach to gender; stereotypically, traits such as leadership, analytics, intellectuality, and ambition are related to

the "masculine" gender role, while qualities such as warmth, compassion, creativity, and loyalty are considered "feminine" (Bem, 1974; Hall & Halberstadt, 1980; Helmreich et al., 1981). However, which characteristics are conceptualized as masculine or feminine vary across cultures and over time (Holt & Ellis, 1998; Zhang et al., 2001).

3.2.1 Gender Nonconformity and Mental Health

Previous studies have found GNC to be associated with several aspects of mental health. For example higher levels of GNC have been shown to be related to more symptoms of mental distress, presenting as higher levels of general psychological distress (Alanko et al., 2008; Mahfouda et al., 2023; van Beusekom et al., 2018), depressive symptoms (Chan, 2022; Folkierska-Żukowska et al., 2022; Issler, Ferreira de Sá et al., 2023), symptoms of separation anxiety (Landolt et al., 2004; VanderLaan et al., 2018), (social) anxiety symptoms (Jewell & Brown, 2014; Lippa, 2008; Folkierska-Żukowska et al., 2022; Ghavami et al., 2020; van Beusekom et al., 2016), symptoms of post-traumatic stress (D'Augelli et al., 2006; Roberts et al., 2012a; Roberts et al., 2012b), and suicidality (Oginni et al., 2019; Plöderl & Fartacek, 2009; Spivey & Prinstein, 2019). GNC was also found to be linked to several transdiagnostic risk factors for mental health problems such as neuroticism (Swift-Gallant et al., 2022), loneliness (Issler, Ferreira de Sá et al., 2023), and difficulties in regulating emotions (Pachankis et al., 2015). Furthermore, GNC has been linked to poorer positive mental health such as lower well-being (Rieger & Savin-Williams, 2012), reduced life satisfaction (Toomey et al., 2010) and life quality (Hu et al., 2019), lower self-esteem (Alberse et al., 2019; Menon et al., 2013; Rijn et al., 2013), and lower levels of resilience (Issler, Ferreira de Sá et al., 2023). However, findings from primary studies have yielded heterogeneous effect estimates, with a small number of studies also reporting no associations between GNC and mental health indicators or even a link between GNC and better mental health, such as lower depressive and (social) anxiety symptoms (e.g., Cook et al., 2013; Pachankis & Goldfried, 2006; Sandfort et al., 2016; Timmins et al., 2018). Thus, while numerous studies suggest a relationship between higher levels of GNC and worse mental health, the effect estimates remain heterogeneous.

3.2.2   *Possible Underlying Pathways and Mechanisms*

Diverse mechanisms have been discussed as driving this relationship, with most approaches stressing the importance of mediating psychosocial processes. Individuals displaying higher levels of GNC face increased stigmatization resulting in victimization (Chan, 2022; van Beusekom et al., 2016), discrimination (Antebi-Gruszka et al., 2022; Ghavami et al., 2020), (childhood) maltreatment (Baams, 2018; Bos et al., 2019; Issler, Ferreira de Sá et al., 2023; Zhao et al., 2021), poorer relationships with parents (Alanko et al., 2008; Landolt et al., 2004) and parental rejection (Landolt et al., 2004), social exclusion (Martin-Storey & August, 2016), and worse relationships with peers (MacMullin et al., 2021) and teachers (Chan, 2022). In line with these finding, meta-analyses have identified a small positive association between GNC and stigmatization experiences (Hu et al., 2023; Thoma et al., 2021). These findings predominantly derive from Western countries but have been replicated in non-Western countries such as China (Chan, 2022) and South Africa (Cook et al., 2013). These experiences are thought to elevate the risk for mental health problems (e.g., Baams et al., 2013; Chan, 2022; Issler, Ferreira de Sáet al., 2023; van Beusekom et al., 2016), which is further supported by longitudinal studies showing that being a victim of bullying, feelings of loneliness, and poor relationships with parents and peers account for the relationship between GNC and mental health (Narita et al., 2024; Roberts et al., 2013).

Anticipation of stigmatization and rejection seems to be an additional stressor that potentially affects mental health more than other minority stressors such as de facto experienced stigmatization, that became non-significant when anticipated stigmatization was included in a mediation model (Puckett et al., 2016). This may lead to perceived social pressure to conform with gender norms, which could enhance the perceived stress, as suggested by the gender role discrepancy stress model (Reidy, Kernsmith et al., 2018; Reidy, Smith-Darden et al., 2018). Attempting to conceal GNC-related identity aspects and the internalization of GNC-related stigmata and heterosexist beliefs such as internalized homophobia or heterosexism might further strengthen these problems (Timmins et al., 2020; van Beusekom et al., 2018).

The direct and indirect consequences of stigmatization also appear to be relevant. For example, childhood maltreatment can increase allostatic load, cause attachment, and social functioning problems, which further increases the vulnerability for mental health problems (Pfaltz et al., 2022). These pathways might also partially contribute to the findings showing GNC to be associated with attachment problems (Landolt et al., 2004), rejection sensitivity (Feinstein et al., 2012), and social anxiety (Feinstein et al., 2012).

Taken together, these multifaceted de facto and anticipated stigmatization experiences and their consequences represent chronic stressors that increase the vulnerability for mental health problems (Hatzenbuehler, 2009; Martin-Storey, 2016; Meyer, 2003). The minority stress model suggests that experiences of stigmatization related to minority status (distal prejudice events; Meyer, 2003) can lead to the internalization of prejudice (proximal prejudice events, e.g., internalized homophobia) and behavioral changes (e.g., concealing aspects associated with their minority identity), which in turn increase the likelihood of mental health problems. The integrative mediation framework of group-specific and general psychological processes (Hatzenbuehler, 2009) extends this assumption by adding general psychological processes—such as cognitive, affective, and social risk factors—that also contribute to minorities' mental health. These processes may also involve transdiagnostic factors such as hopelessness, rumination, emotional regulation problems, and social isolation. Both models share the understanding that it is not the minority status per se (e.g., higher levels of GNC) that leads to mental health problems, but rather psychosocial factors such as social stigmatization and its consequences.

In this context, prejudices related to homosexuality were also found to be relevant. The link between GNC and homosexuality is complex. On average, homosexual individuals tend to present more GNC than their heterosexual counterparts (Bailey & Zucker, 1995; Lippa, 2008), and GNC in childhood has also been found to be a predictor of later minority sexual orientation (Li et al., 2017). However, not every individual showing GNC in childhood identifies as belonging to a sexual minority in later life nor do all gender-conforming individuals identify as heterosexual (Lippa, 2008; Rieger et

al., 2008). However, those with higher GNC are often perceived as belonging to sexual minorities because of their gender expression (Baams et al., 2013), which makes them targets for homophobic stigmatization (Skidmore et al., 2006). In line with these observations, individuals with higher levels of GNC also report more homophobic bullying (D'haese et al., 2016; van Beusekom et al., 2018, 2020), regardless of their sexual orientation (van Beusekom et al., 2020). GNC was thus found to account for disparities in the mental health of sexual minorities, as it is a (partially) visible attribute (Rieger & Savin-Williams, 2012; Skidmore et al., 2006). This idea is supported by studies showing that the mental health problems of sexual minorities are better predicted by GNC or GNC-related harassment than by sexual orientation (e.g., Martin-Storey & August, 2016; Rieger & Savin-Williams, 2012), and that gender-nonconforming sexual minority individuals also experience more victimization than their gender-conforming counterparts (D'haese et al., 2016).

Another pathway for the relationship between GNC and mental health might be gender dysphoria, which refers to the distress an individual experiences due to an incongruence of their gender identity (i.e., their personal sense of their own gender) and their gender assigned at birth (APA, 2015). It is often comorbid with other mental health problems (Paz-Otero et al., 2021; Thompson et al., 2022). Gender dysphoria is associated with GNC, as individuals with gender dysphoria often engage in gender-nonconforming behaviors as part of their gender expression (APA, 2015). However, the two constructs are distinct (Davy & Toze, 2018), and not every individual showing GNC experiences gender dysphoria (Kaltiala-Heino et al., 2018). For gender minorities—that is, any individual who does not identify with their sex assigned at birth (i.e., individuals who are transgender or nonbinary; Reisner et al., 2014)—the link between GNC and gender dysphoria may partly account for the association with mental health.

Moreover, when looking at different mental health outcomes (e.g., mental distress vs. positive mental health, different types of mental distress), different mechanisms might also come into play (Beltz et al., 2021). The association between GNC and depressive symptoms was found to be partly driven by experiences of being bullied (Narita et al., 2024; Roberts et al., 2013), while the

relationship with social anxiety was accounted for by rejection sensitivity (Feinstein et al., 2012).

However, the link between GNC and self-esteem might be better explained by communality or social

closeness (Beltz et al., 2021; DiDonato & Berenbaum, 2013).

Despite the varying pathways, what these findings have in common is that they support the

importance of social stigmatization in GNC. Taken together, exposure to acute (e.g., severe

experiences of being bullied) and chronic social stress (e.g., repeated social exclusion) is probably the

most important mechanism linking GNC and mental health. Thus, the risk factor for mental health

problems might not be GNC per se, but rather individuals expressing GNC might be at greater risk for

exposure to psychosocial stressors, which in turn may cause the onset and persistence of mental

health problems (Bjornsson et al., 2020; Grant et al., 2003; LeMoult et al., 2020; Nicholson et al.,

2022; Oncioiu et al., 2023).

3.2.3 *Possible Moderators Influencing the Relationship between GNC and Mental Health*

Although most studies have suggested a link between higher levels of GNC and more severe

mental health problems, there are also studies, in relevant numbers, showing null effects or even

inverse associations linking higher GNC to better mental health (e.g., Cook et al., 2013; Pachankis &

Goldfried, 2006; Sandfort et al., 2016; Timmins et al., 2018). It is thus crucial to identify factors that

account for these between-study differences in the association of GNC and mental health.

3.2.3.1 Cultural Factors

Spence and Helmreich (1978) emphasized the importance of the social context for the

differentiation of gender roles and norms. They assumed that social context influences which tasks,

rights, and privileges are traditionally ascribed to the male and female genders, as well as how

people should behave in their interactions with others and how deviations from gender roles and

norms are handled. We therefore expected that sociocultural factors may affect the relationship

between GNC and mental health.

Geographical and Socioeconomic Differences. Cook et al. (2013) and Sandfort et al. (2016)

found no association between GNC and depressive symptoms in two samples of Black South African

gay and bisexual men and discussed whether this finding might be driven by differences between Western high-income countries and low- to middle-income countries. Thus, the geographical region where the study was conducted may affect the relationship between GNC and mental health. There might also be differences related to socioeconomic indicators, such as country-level income (World Bank, 2022b), gross domestic product (GDP, World Bank, 2022a), or the Human Capital Index (United Nations Development Programme, 2022). For example, research on the relationship between socioeconomic indicators (i.e., GDP per capita) and homophobia suggests there is greater homophobia in countries with lower GDP (Lamontagne et al., 2018), which might similarly apply to the stigmatization of GNC due to its association with homophobia. Moreover, socioeconomic indicators seem to affect the association between femininity and depressive symptoms (J. Lin et al., 2021). Thus, socioeconomic indicators, as a proxy for cultural differences, might be a relevant moderator of the relationship between GNC and mental health.

Gender (In)Equality. In two studies on 15 countries in total, Zentner and von Aufsess (2022) showed that the relationship between GNC and self-esteem varies between countries. In both studies, country-level gender equality moderated the association between GNC and lower self-esteem, with weaker associations for countries with higher gender equality. Following their results, the decreasing associations may have resulted from higher gender equality being associated with greater openness to divergence from traditional gender roles.

Homophobia. Given the close link between (the stigmatization of) GNC and homosexuality country-level homophobia might also affect the relationship between GNC and mental health. More institutional (e.g., laws and legislations against sexual minorities) and social homophobia (e.g., direct reactions toward sexual minorities) might therefore result in more stigmatization of individuals perceived as belonging to sexual or gender minorities, which in turn might increase the association between GNC and mental health problems. Furthermore, it seems like greater country-level homophobia is also associated with gender inequalities and human rights violations (Lamontagne et al., 2018).

Cultural Dimensions. Differences in culture per se may also have a significant impact on the relationship between GNC and mental health, as culture influences gender roles and how deviations from these roles are handled (Spence & Helmreich, 1978). For example, the strong influence of Confucianism, collectivism, and patriarchy in Asian countries reinforces the persistence of traditional gender roles (Chan, 2022; Mountford, 2010; Yu & Winter, 2011). For example, GNC might perceived as a threat to family values, social norms, and cultural notions of masculinity, thus resulting in more stigmatization (Chan, 2022) and subsequently more mental distress. Culture can be operationalized according to the framework of Hofstede et al. (2010) to provide a better understanding of the influence of cultural values on the relationship between GNC and mental health. Their model is often used in comparative cultural psychological studies to explain differences between cultures (e.g., Barbalat & Liu, 2023; Cheng et al., 2023) and includes six dimensions: individualism, masculinity, uncertainty avoidance, indulgence, power distance, and long-term orientation. Specifically, the dimensions of individualism, masculinity, uncertainty avoidance, and indulgence are found to be related to cultural gender roles and how deviations from these roles are handled. **Individualism** describes the importance of relationships within a culture, with individualistic cultures focusing on individuals and their own needs; this is accompanied by a higher tolerance toward the individual needs of others, a potentially higher acceptance of GNC, and a weaker link between GNC and mental health (Hofstede et al., 2010). In **masculine** cultures, there is a clear distinction of gender roles, with men expected to be competitive and tough, and women expected to be modest and tender, whereas in feminine cultures, gender roles overlap, and a switch in gender roles is more acceptable. This may result in a weaker correlation between GNC and poorer mental health in these cultures. Cultures with high levels of **uncertainty avoidance** also usually have a rigid system of rules and norms to avoid potential uncertainties. Behavior not conforming with those norms is judged to be dangerous. Low values of uncertainty avoidance are associated with openness to new and different things. Accordingly, cultures with high uncertainty avoidance may have a lower acceptance of GNC, which may strengthen the link between GNC and poorer mental health. Furthermore, the satisfaction of

needs and life satisfaction are vital in cultures with high levels of **indulgence**, whereas in cultures with low levels of indulgence (i.e., restraint cultures), these needs are restricted and regulated by social norms. This may result in "loosely prescribed gender roles" in indulgent cultures and "strictly prescribed gender roles" in restraint cultures; GNC is thus expected to be more accepted in indulgent cultures, as reflected in a weaker correlation between GNC and poorer mental health. There are no clear relationships between gender roles and the dimensions power distance and long-term orientation, but these may still influence the relationship between GNC and mental health. **Power distance** is the degree to which less powerful members of institutions (e.g., families, schools, community members) expect and accept power to be distributed unequally within a given society. Countries with lower levels of power distance emphasize equality and interdependence, which possibly reduces the correlation between GNC and mental health. In contrast, more power distant societies accept and expect inequalities. **Long-term orientation** refers to the fostering of virtues related to future rewards (i.e., perseverance and thrift), which is reflected in less reliance on universal guidelines and higher consideration of circumstances. In contrast, short-term orientation refers to the promotion of virtues related to the past and present (i.e., respect for traditions, preservation of "face," and fulfilling social obligations). Societies with a short-term orientation have a greater focus on traditions (including gender roles) and appear more fundamentalist, which may lead to lower acceptance of gender role deviations and might in turn result in a stronger link between GNC and mental health. Although we discuss a potential role of the Hofstede dimensions power distance and long-term orientation, we did not have specific hypotheses for these dimensions and examined them on an exploratory basis.

3.2.3.2   Individual Factors

The individual characteristics of participants might also affect the relationship between GNC and mental health.

Participants' Gender. Research has indicated that the level of acceptance toward GNC varies depending on individuals' gender, with some studies suggesting that GNC is less likely to be accepted

in men than in women (e.g., D'Augelli et al., 2006; Sanborn-Overby & Powlishta, 2020). This disparity

could be attributed to social stigmatization, which potentially leads to increased victimization

experiences among men (Thoma et al., 2021) and consequently exerts a more detrimental effect on

men's mental health (van Beusekom et al., 2018). Other studies have found more victimization in

women (Warren et al., 2022) or no gender differences (Gordon et al., 2018).

Gender minority individuals might also exhibit stronger correlations between GNC and

mental health problems. This stronger link might be (partly) attributable to gender dysphoria and

additional minority stress experienced by gender minority individuals, thus potentially leading to

more severe mental health problems (Testa et al., 2015).

Sexual Orientation. Sexual orientation has been discussed as another relevant factor, with

some studies showing stronger associations between GNC and poor mental health for sexual

minorities than for their heterosexual counterparts (e.g., Plöderl & Fartacek, 2009). However, recent

studies suggest that GNC-related victimization is relevant irrespective of individuals' sexual

orientation (e.g., Ioerger et al., 2015; Roberts et al., 2013), which in turn results in comparable

associations for both sexual minorities and heterosexual individuals (Folkierska-Żukowska et al.,

2022; Gordon et al., 2018; Issler, Ferreira de Sá et al., 2023). Only a few studies have examined more

diverse sexual orientations, with Timmins et al. (2021) finding differences in the expression of

childhood GNC between sexual minorities and in the association between GNC and mental health

outcomes.

Ethnic Identity. Samples vary with respect to ethnic diversity. Based on some studies

showing differences in ideas about gender roles and the perception of GNC between ethnic groups

(Lehavot, King, & Simoni, 2011; Moore, 2006), the link between GNC and mental health may also

vary between ethnic groups. Those effects might also be driven by intersectional stigmatization

based on ethnic identity (Ghavami et al., 2020; McConnell et al., 2018).

Participants' Age. Participants' (mean) age might be interesting from two perspectives—that

is, as an indicator of cohort effects and for age-related differences, both of which may have an

impact on the link between GNC and mental health. The growing acceptance of GNC and

homosexuality since the 1990s might have resulted in less stigmatization in younger cohorts (e.g.,

Keleher & Smith, 2012). The frequency and impact of victimization might also differ between life

phases (e.g., Plöderl & Fartacek, 2009; van Beusekom et al., 2020). Some authors have assumed that

experiences of stigmatization in childhood and adolescence have a particularly strong influence on

mental health (Oncioiu et al., 2023; Toomey et al., 2010; van Beusekom et al., 2020). Accordingly,

one would expect younger samples (or GNC in childhood and adolescence) to show a stronger link

with mental health. However, those effects might be confounded with cohort effects, with older

cohorts being exposed to higher levels of stigmatization, which might also result in a stronger link

between GNC and mental health for older samples.

Clinical versus Nonclinical Samples. Differences in sample characteristics could have an

additional impact. For example, correlations between GNC and mental health in samples recruited

from clinical contexts or selected based on clinical criteria might differ from those in nonclinical

samples. This variation could be due to the heightened vulnerability and/or specific stressors present

in clinical populations. At the same time, clinical samples may show limited variance in both GNC and

mental health, which could result in a smaller relationship.

3.2.3.3   Methodological Factors

Between-study differences in the association of GNC and mental health may also be

accounted for by heterogeneity in the operationalization and assessment of GNC and mental health.

Type of GNC Measures. There are numerous measures that claim to assess GNC, yet they

vary substantially with respect to the underlying constructs, with some instruments assessing

aspects of gender expression, and others measuring gender roles and/or personality characteristics

(Green et al., 2018; Lehavot, King, & Simoni, 2011). The idea of heterogeneity resulting from

divergent measures is further supported by the often only moderate associations between different

measures. We would therefore expect that the GNC measure might also affect the relationship

between GNC and mental health. A recent systematic review by Hu et al. (2023) proposed three

categories of GNC measures: behavior-based measures, personality-based instruments, and mixed GNC measures comprising both behavior- and personality-related aspects of GNC to varying degrees.

Developmental Period. GNC measures assess GNC at different developmental periods—that is, GNC during childhood, adolescence, and/or adulthood. A systematic review and meta-analysis found that the link between childhood GNC and victimization is stronger than the link between adult GNC and victimization for sexual minority samples (Thoma et al., 2021). Whether this stronger association for childhood GNC also applies to its link with mental health has not yet been tested. However, some studies have suggested that GNC decreases over the lifespan due to the social pressure to conform to the cultural gender roles (Landolt et al., 2004). This might lead to a smaller correlation between GNC and mental health in adulthood than in earlier developmental periods.

Self- versus Other-reports. Studies differ with respect to the use of GNC measures involving self-report and other-person report, with the latter including ratings by parents (e.g., Gender Identity Questionnaire for Children; Johnson et al., 2004) and trained observers (Jacobson et al., 2016; Skidmore et al., 2006). Previous research has suggested that visible and behavioral markers might be more relevant for mental health disparities than the non-observable self-concept (Lehavot, King, & Simoni, 2011; Wylie et al., 2010). This may also apply to the type of report—other-reports, which are more likely to rely on visible and behavioral indicators, may show a stronger association with mental health.

Retrospective versus Present GNC. There are between-study differences in the timing of GNC assessment, with some GNC measures assessing GNC retrospectively (i.e., childhood GNC assessed in adults) and others assessing present GNC (i.e., childhood GNC assessed in children). Due to known problems with retrospective assessments, these may produce biases (Hardt & Rutter, 2004). Some authors have suggested that some individuals (e.g., members of sexual minority groups) might tend to overestimate childhood GNC (Rieger et al., 2008). This effect might be more pronounced for adults with mental health problems (Wenze et al., 2012) and may result in inflated associations for retrospective GNC measures.

Mental Health Assessment. Mental health measures vary in a comparable manner, with differences in the assessed mental health domain ranging from mental health problems to resilience factors. Studies have also employed different types of report (self- vs. other-report), different timing for assessments (retrospective vs. current mental health status), and targeting of divergent developmental periods (childhood vs. adolescence vs. adulthood). Between-study differences may also account for heterogeneous associations between GNC and mental health.

Study Characteristics. First, differences can be found in study design, with most studies employing cross-sectional designs, while longitudinal studies remain rare (e.g., Jones et al., 2017; Mahfouda et al., 2023; Narita et al., 2024; Oginni et al., 2019). Second, the year of publication might affect the relationship between GNC and mental health due to changes in the acceptance GNC and sexual minorities over the last 30 years. Thus, publication year may also partly reflect cohort effects.

3.2.4   *Prior Evidence Syntheses on the Relation between Gender Nonconformity and Mental Health*

To our knowledge, this is the first systematic review on the relationship between GNC and mental health. Previous evidence syntheses on GNC have focused on gender identity and examined various aspects of mental health in gender minorities (e.g., Connolly & Gilchrist, 2020; Gosling et al., 2022; Y. Lin et al., 2021; Paz-Otero et al., 2021; Tankersley et al., 2021; Valentin & Shipherd, 2018), or the association between gender dysphoria and mental health (e.g., Marconi et al., 2023; Thompson et al., 2022). These reviews were also qualitative and did not include a meta-analysis.

Although a recent systematic review and meta-analysis did not specifically examine GNC, its analyses revealed a robust link between gender roles and depressive symptoms (J. Lin et al., 2021), and suggested that higher levels of masculinity might be a protective factor regardless of gender, while femininity was a protective factor in women but not in men. The review also showed that greater life expectancy at birth reduced the negative link between masculinity and depressive symptoms, while the relationship between femininity and lower levels of depressive symptoms in women increased with higher education and higher country-level gross national income per capita.

3.2.5   *Present Study*

This study is the first systematic review and meta-analysis of the relationship between GNC and mental health that includes indicators of both mental distress and positive mental health. Based on the finding of substantial between-study heterogeneity in research on the link between GNC and mental health, this systematic review sought to shed light on potential moderators of the association by examining factors at the levels of culture, participants, and methodology.

3.3   **Methods**

3.3.1   *Transparency and Openness*

Our project adhered to the standards of the Cochrane Collaboration (Higgins et al., 2022) and was reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines (Page et al., 2022). All data and *R* codes used for meta-analysis can be accessed via the Open Science Framework (OSF) project (

https://osf.io/p9zrj/?view_only=8a291229a83548489ef72867f31008d1). This systematic review was prospectively pre-registered at the OSF on November 4, 2022 (

https://osf.io/p9zrj/?view_only=8a291229a83548489ef72867f31008d1). In contrast to the preregistration, for our final review we cumulated different symptom types (e.g., anxiety symptoms, depressive symptoms) under the umbrella category 'mental distress'. Most importantly, we have included additional moderators during the review process. This primarily affected cultural factors such as GDP per capita, Homophobic Climate Index, and the cultural dimensions according to Hofstede et al. (2010). Moreover, based on the major impact of GNC measure type on our findings and comments during the peer-review process, we decided to calculate joint moderator analyses with moderators being tested in models that already included GNC measure type (see SM-1 for a complete overview of differences).

3.3.2   *Search Strategy*

We conducted a systematic literature search in five electronic databases: APA PsycNET (including PsycINFO, PsycARTICLES, and PsycExtra), Embase.com, PSYNDEX, Scopus, and Web of

Science Core Collection[1]. The final search was finally updated on November 3, 2022. The search strategy comprised two clusters of search terms applied in all fields: (a) terms related to GNC and (b) terms related to mental health. Within a cluster, terms were combined with the Boolean operator "OR," while the clusters were combined using the Boolean operator "AND." Resulting in the following key search terms (presented for Embase): (*gender variance* OR *gender non*conform** OR *gender conform** OR *gender diverse* OR *gender atypical* OR *gender typical* OR *gender expression* OR *gender nonbinary*) AND (*depression* OR *depress** OR *anxiety* OR *mental disease* OR *mental illness* OR *mental disorder* OR *psychological distress* OR *mental distress* OR *suicide* OR *suicidal behavior* OR *posttraumatic stress disorder* OR *ptsd* OR *post*traumatic stress* OR *mental stress* OR *stress* OR *substance use* OR *substance abuse* OR *sleep* OR *eating disorder* OR *disordered eating* OR *drinking* OR *drug dependence* OR *attention deficit hyperactivity disorder* OR *adhd* OR *well-being* OR *well*being* OR *quality of life* OR *life satisfaction* OR *psychological health* OR *mental health*). Medical Subject Heading and EmTree terms were used when available. The search strategies per database are presented as Supplemental Material (SM-2). Terms used in the GNC cluster were derived from a previous meta-analysis on the association between GNC and victimization (Thoma et al., 2021). The reference lists of all included studies and previous related research syntheses were screened for additional primary studies. We attempted to acquire missing information from eligible studies by contacting 20 primary study authors via email. Of those, two authors provided additional information (MacMullin et al., 2021; Vantieghem et al., 2018). We also asked the contacted authors for additional unpublished data.

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[1] The Web of Science Core Collection subscription includes Science Citation Index Expanded – Perpetual (1945–), Social Sciences Citation Index – Perpetual (1956–), Arts & Humanities Citation Index – Perpetual (1975–), Medline – Time Limited (1950–), and InCites JHCD – Lease, JCR perpetual (1997–).

3.3.3   Inclusion and Exclusion Criteria

3.3.3.1   Population

We included studies with participants of all ages, irrespective of their gender, sexual orientation, ethnicity, nationality, and mental and physical health status.

3.3.3.2   Outcome Measures

Studies were required to report at least one zero-order correlation (e.g., Pearson's product-moment correlations, Spearman's rank correlations, odds ratios and beta coefficients of linear regressions when no other variables were included in the model) of a GNC measure and a mental health outcome. When primary studies reported on odds ratios based on continuous GNC measures, those were transformed to zero-order correlations using the formular provided by Sánchez-Meca et al. (2003). If a study reported both cross-sectional and longitudinal correlations, those were averaged for the main analyses and included separately for the moderator and sensitivity analyses, with those analyses accounting for their dependency.

3.3.3.3   Restrictions on Study Inclusion

There were no restrictions regarding publication language,[2] publication date, study design, setting, samples size, or sampling method.

3.3.4   Study Selection

Following de-duplication in Zotero, two reviewers independently screened titles and abstracts using Rayyan (Ouzzani et al., 2016). Interrater reliability was almost perfect at the title/abstract level (κ = .88) and substantial at the full-text level (κ = .75). Disagreements were resolved through discussion or by consulting a third reviewer (senior researcher) for both levels of screening.

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[2] If a study had been written in a language that could not be read by the review team, the review team would have contacted the primary study authors, would have involved the university's language learning center, or would have used artificial intelligence tools (e.g., DeepL or ChatGPT) to obtain translations. However, such cases did not occur during the screening process.

3.3.5   Data Collection

A customized data extraction sheet was developed for this research synthesis. One reviewer

extracted the data, while a second reviewer checked the data. Any disagreements were resolved

through discussion with a senior researcher. We extracted information on the respective record (i.e.,

authors, title, publication year, journal); study characteristics (i.e., authors' country, country of data

collection, study design, intervention study, main topic of study); and sample (e.g., sample

description, sample size, proportion of men in the sample). We also extracted details about GNC and

mental health measures (e.g., labels as used in study, operationalization, type of report,

developmental phase, internal consistency) as well as statistical information (e.g., effect estimate,

sample size used for calculation). Detailed information on the extracted data can be found in the data

extraction sheet and code book (see OSF-repository:

https://osf.io/p9zrj/?view_only=8a291229a83548489ef72867f31008d1). The agreement between

the raters was almost perfect for the extraction of effect estimates (98.28%) and moderator

information (99.67%).

3.3.5.1   Methods for Quality Assessment and Internal Risk-of-bias

The quality of the included primary studies was assessed using an adapted version of the

National Institute of Health (NIH) Quality Assessment Tool for Observational Cohort and Cross-

Sectional Studies (National Heart, Lung, and Blood Institute, 2014). Seven items from the original

tool were removed, as they did not capture aspects relevant to study quality for our review question.

One item from the checklist for analytical cross-sectional studies in the critical appraisal tools for use

in JBI systematic reviews was added (JBI, 2020). Overall, eight items were used to evaluate the

quality of the included primary studies (see Table 1). All items were rated as *yes*, *no*, *not reported*, or

unclear (see SM-10.1 for the rating sheet). Two reviewers independently performed the quality

assessment, with disagreements resolved by consulting a senior researcher. The results are

presented in a risk-of-bias (ROB) diagram and controlled for sample size to account for the impact on

the overall bias risk (McGuinness, 2021).

Table 1. *Overview of Quality Assessment and Risk-of-Bias Domains*

Domain	Criteria
Research Question[a]	Was the research question or objective in this paper clearly stated?
Study Population[a]	Was the study population clearly specified and defined?
Participation Rate[a]	Was the participation rate of eligible persons at least 50%?
Recruiting[a]	Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?
Statistical Power[a]	Was a sample size justification, power calculation, or a priori variance and effect estimates provided?
Reliability and Validity of Measures[a]	Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?
Confounding Variable[a]	Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?
Statistical Analysis[b]	Was the statistical analysis appropriate?

Note. The table provides an overview of the items used for the quality assessment.

[a] Items taken from the National Institute of Health (NIH) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (National Heart, Lung, and Blood Institute, 2014).

[b] Item taken from the Checklist for Analytical Cross-Sectional Studies in the Critical Appraisal Tools for use in JBI systematic reviews (JBI, 2020).

3.3.5.2 Operationalization and Assessment of GNC

The operationalization of GNC varied widely among the primary studies. In this research synthesis, we adopted the distinction between behavior-based (e.g., the Recalled Childhood Gender Role/Gender Identity Questionnaires; Zucker et al., 2006), personality-based (e.g., Bem Sex Role Inventory [BSRI]; Bem, 1974), and mixed measures, as proposed by Hu et al. (2023). Mixed GNC measures included both behavior- and personality-related items. Measures asking for an overall assessment of one's own femininity or masculinity were also categorized as mixed GNC measures, as the rater may use information from both domains for their rating. For example, Lowry et al. (2018) asked, "A person's appearance, style, dress, or the way they walk or talk my affect how people describe them. How do you think people at school would describe you?" Subjects were asked to respond on a scale ranging from *very feminine* to *very masculine*. Following this idea, we considered GNC to be an attribute that ranges along a continuum from low to high GNC for the current research synthesis. We thus defined GNC as having high ratings on the femininity scale for men and high ratings on the masculinity scale for women (APA, 2015; Thoma et al., 2021).

3.3.5.3 Operationalization and Assessment of Mental Health

For mental health outcomes, we distinguished between the broader outcome categories of mental distress, positive mental health, and body image problems. Mental distress comprised measures of anxiety symptoms, depressive symptoms, externalizing symptoms, general psychological distress, internalizing symptoms, post-traumatic stress symptoms, social anxiety symptoms, substance use, and suicidality. Positive mental health included measures of self-esteem and well-being. Body image problems included measures assessing satisfaction with the body or body parts, appearance, and/or body shape. We had no a priori finite list of eligible mental health outcomes, as we were interested in the broad range of mental health constructs examined in primary studies and their association with GNC. We were thus also interested in the association of GNC with well-established transdiagnostic risk and protective factors (e.g., rumination, difficulties in emotion regulation, sleep problems). However, analyses were limited to those outcomes that were assessed

in at least five primary studies (for an overview of included mental health measures see SM-4). All correlations were coded such that positive correlations corresponded to higher GNC (i.e., more gender atypical behavior or appearance or greater femininity in men) being associated with poorer mental health (i.e., greater mental distress, poorer self-esteem and well-being, more body image problems, and more rumination).

3.3.5.4   Moderators

We coded information on moderators including cultural, individual, and methodological factors. Most data were directly coded from the included primary studies. For some cultural moderators, we used additional databases. Table 2 presents an overview of all moderators examined in this review, including the respective data source.

3.3.6   Data Synthesis

Included studies were summarized narratively and in tabular form. Meta-analyses were performed in R version 4.2.3 (R Core Team, 2022) using the packages "metafor" (Viechtbauer, 2010) and "clubSandwich" (Pustejovsky, 2023). Effect estimates and corresponding sampling variances were calculated based on raw correlation coefficients and sample sizes. Effect estimates were pooled for single primary studies when more than one effect estimate was available per outcome (e.g., two correlations were reported for the relationship between GNC and depressive symptoms). All analyses used random-effect models and maximum likelihood estimations with robust variance estimation (RVE; Sidik & Jonkman, 2006) and CR1 small-sample adjustment (Hedges et al., 2010) to account for dependent effect estimates (e.g., effect estimates on multiple mental health outcomes or two types of GNC from the same primary study). In cases where multiple publications reported on the same study, different effect estimates were included when publications reported on different mental health outcomes. When both publications reported on the same outcomes based on data from the same study, we included the publication reporting on the largest sample. For all analyses, we report the (cluster-robust) effect size estimate, its 95% confidence intervals (CIs), and the respective prediction intervals (PI) when more than 10 effect estimates were included in the respective analysis

(Deeks et al., 2019). Prediction intervals represent an estimate of the interval, in which 95% of future observations would fall, and are an important indicator of the precision of effect estimates derived by meta-analysis (IntHout et al., 2016).

3.3.6.1 Main Analysis

The main analyses sought to answer the question of whether there is a relationship between GNC and mental health. Analyses were performed separately for the outcome categories of mental distress, positive mental health (i.e., self-esteem and well-being), body image problems, and rumination. This decision was based on previous research differentiating mental distress/illness and (positive) mental health (Lukat et al., 2016; Payton, 2009). Moreover, we performed separate analyses on rumination as a transdiagnostic risk factor and body image problems. We refrained from including body image problems in our analyses on mental distress, as we identified a substantial overlap in item content between measures of GNC and body image problems, which could have resulted in artificially inflated associations. For mental distress, we used a multilevel approach with nesting effect estimates of symptom measures within studies and outcome types (Assink & Wibbelink, 2016). Our model thus allowed for correlations of effect estimates from the same study and correlations of effect estimates from different studies that assessed the same outcome type. Because our dataset violated the assumption that individual outcomes are independent, we estimated the variance-covariance matrix of the sampling errors of dependent effect sizes. We assumed an intercorrelation of $\rho = .45$ between the outcomes from the same study and within the same sample (see SM-10 for studies used to derive this estimate). We examined potential overparameterization by means of profile likelihood plots for each multilevel model. In case of evidence for overparameterization, we conducted separate analyses for single outcome types nesting effect estimates within studies. This approach also applied to our analyses of body image problems and rumination.

In total, we conducted five meta-analyses: (a) a 3-level meta-analysis investigating the relationship between GNC and mental distress. As models for positive mental health showed signs of

overparameterization, two 2-level meta-analyses were performed on the relationship between (b)

GNC and self-esteem as well as (c) GNC and well-being. Moreover, 2-level meta-analyses were

conducted for the association between (d) GNC and body image problems, as well as on the

association between (e) GNC and rumination.

3.3.6.2 Heterogeneity

To assess statistical heterogeneity, we used Cochran's Q statistic (Cochran, 1954), with a

significant Q test indicating the presence of heterogeneity. To estimate the between- and within-

study variance, we used the random-effects variance components σ, which corresponds to the

between-study heterogeneity variance τ in conventional meta-analyses (Harrer et al., 2021). We

used the I^2 statistic to assess the extent of heterogeneity. The I^2 statistic ranges between 0% and

100%, with an $I^2 \geq 50\%$ indicating a substantial amount of between-study heterogeneity (Deeks et al.,

2019). For the 3-level meta-analyses, heterogeneity was differentiated between and within studies

(i.e., between different outcome types). For the 2-level meta-analyses (i.e., self-esteem, well-being,

body image problems, and rumination) we reported heterogeneity at the between-study level.

3.3.6.3 Moderator Analysis

For moderator analyses, we used subgroup analyses for categorical moderators (e.g.,

samples solely comprising men vs. women), while meta-regressions were used for omnibus tests and

continuous moderators (e.g., mean age of samples), with significant Q_M statistics indicating the

presence of moderator effects (Viechtbauer, 2010). Subgroups were examined when at least five

effect estimates per moderator level were available. When studies provided no information on a

moderator variable, they were excluded from the respective analysis. We examined the effect of

cultural, individual, and methodological moderators (see Table 2 for an overview). Moderator

analyses were limited to mental distress and self-esteem, as only a small number of effect estimates

was available for body image problems and rumination.

First, we assessed the moderator effect of the GNC measurement type and found significant

differences between behavioral-based, mixed, and personality-based measures, with inverse

associations between GNC and mental health depending on the type of measurement. To check for a significant improvement in model fit by the inclusion of GNC measure type, we performed a likelihood ratio test (LRT; Harrer et al., 2021). Based on this finding, we decided to examine all other moderators in a model already including GNC measurement type. The models thus included the main effects of GNC measurement type and the moderator of interest along with their interaction. When under five effect estimates were available per GNC measurement type, we performed the respective analysis solely based on the GNC measurement type for which a sufficient number of effect estimates was available. To enhance interpretability, mixed measures were excluded from moderator analyses.

3.3.6.4 Publication Bias

Based on the recommendation to combine different methods (Harrer et al., 2021), the impact of publication bias was examined using five approaches. First, at the single mental health outcome level, we used the Begg–Mazumdar rank correlation test (Begg & Mazumdar, 1994) to examine an association of effect estimates and standard errors, with a significant test statistic providing evidence for the presence of a publication bias. Second, we used Egger's regression test (Egger, 1997) to assess funnel plot asymmetries; a significant test statistic provides evidence for asymmetry and might point to the presence of publication bias. Third, we used Duval and Tweedie's (2000) trim and fill method; using a nonparametric approach, this method estimates the number of missing effect estimates on one side of the funnel plot and adds those "missing" studies to artificially correct for the potential impact of publication bias. Based on this new set of effect estimates, a corrected overall effect estimate is provided, with larger discrepancies between the main analysis and the trim and fill estimate pointing to a potential impact of bias. Fourth, at the single outcome level, we used the precision-effect test and precision-effect estimate with standard error (PET-PEESE) approach (Stanley & Douciuliagos, 2014) focusing on the association of effect estimates and precision. In this approach, standard errors are included as a moderator in the main analyses to examine whether there is an association between effect estimates and precision, with a

Table 2. *Overview and Description of the Moderators*

Moderator	Description	Database	Range/Levels	Type
		Cultural factors		
Geographical information				
Continent	The moderator provides information about the continent on which the study was conducted.	coded from primary study	(a) Africa (b) Asia (c) Europe (d) North America (e) South America (f) Oceania	Categorical
Socioeconomic indices				
World Bank Atlas Income Classification	The World Bank Atlas classification distinguishes between four groups of countries based on their gross national income.	World Bank (2022b)	(a) low-income (b) lower-middle income (c) upper-middle income (d) high-income	Categorical
Gross Domestic Product per Capita [in $ 10,000]	"The gross domestic product (GDP) per capita is the sum of gross value added by all resident producers in the economy plus any product taxes (less subsidies) not included in the valuation of output, divided by mid-year population." (World Bank, 2024)	World Bank (2022a)	$300 to $234,000	Continuous

Moderator	Description	Database	Range/Levels	Type
Human Capital Index	Scores quantify the country's human capital based on indicators of survival, education, and health.	United Nations Development Program (2022)	0-1, with higher scores indicating a greater reached potential	Continuous
Gender Equality Indices				
Global Gender Gap Index (GGI)	Scores quantify gender gaps within societies based on four domains: economic participation and opportunity, educational attainment, health and survival, and political empowerment.	World Economic Forum (2022)	0 – 1, with higher scores indicating higher gender equality	Continuous
Social Institutions and Gender Index (SIGI)	Scores quantify discrimination against women in social institutions (i.e., formal and informal laws, social norms and customary practices) based on four domains: discrimination in families, restricted physical integrity, restricted access to productive and financial resources, and restricted civil liberties.	Organization for Economic Co-operation and Development (2023)	0-100, with higher scores indicating lower gender equality	Continuous
Homophobia				
Homophobic Climate Index	Scores quantify country-level homophobia including institutional (e.g., enforcement laws that criminalize or protect same-sex relationships) and social homophobia (e.g., acceptance, tolerance, violence against homosexuality).	Lamontagne et al. (2018)	0-1, with higher scores indicating higher levels of homophobia	Continuous

Cultural Dimensions

Masculinity	Scores quantifies wheter societies are are more competitive and assertive (masculine) or modest and nurturing (feminine).	Hofstede Insights (2023)	0-100, with higher score indicating more masculinity	Continuous
Individualism	Score quantifies how strongly the individual is emphasized over the group in a society.	Hofstede Insights (2023)	0-100, with higher score indicating more individualism	Continuous
Uncertainty avoidance	Score quantifies how societies manage uncertainty and unpredictability by favoring rules, laws, and safety measures.	Hofstede Insights (2023)	0-100, with higher score indicating more uncertainty avoidance	Continuous
Long-term orientation	Score quantifies whether cultures place greater value on the future or emphasize the past and present.	Hofstede Insights (2023)	0-100, with higher score indicating more long-term orientation	Continuous
Power distance	Score quantifies how a society handles inequalities in power and authority.	Hofstede Insights (2023)	0-100, with higher score indicating more power distance	Continuous
Indulgence	Score quantifies the extent to which cultures allow or suppress pleasure and the enjoyment of life.	Hofstede Insights (2023)	0-100, with higher score indicating more indulgence	Continuous

	Individual factors			
Participants' gender				
Gender (percent)	Percentage of men in the study sample as indicator for differences between men and other genders.	coded from primary studies	0-100%, with higher scores representing a higher percentage of men in the sample	Continuous
Gender (samples)	The moderator distinguishes between two categories (men versus women) of samples based on their (binary) gender.	coded from primary studies	(a) solely men (b) solely women	Categorical
TGNC	The moderator distinguishes between two categories of samples based on their gender identity as indicator for differences between cisgender and gender minority individuals.	coded from primary studies	(a) TGNC (b) non-TGNC	Categorical
Sexual orientation	Percentage of heterosexuals in the sample as indicator for differences between heterosexual and sexual minority participants.	coded from primary studies	0-100%, with higher scores representing a higher percentage of heterosexuals in the sample	Continuous
Ethnic Identity	Percentage of ethnic identities in the study sample. Extracted for the following ethnic identities: (a) Aboriginal (b) African American and Black (c) Arab (d) Asian (e) Caribbean	coded from primary studies	0-100%, with higher scores representing a higher percentage of the respective ethnic identity in the sample	Continuous

	(f) Caucasian and White			
	(g) Hispanic / Latinx			
	(h) Native			
Participants' age	Mean age of the study sample	coded from primary studies	not restricted	Continuous
Sample type	The moderator differentiates between studies conducted in clinical setting or with participant with a diagnosed mental health condition and studies conducted in a nonclinical setting.	coded from primary studies	(a) clinical (b) nonclinical	Categorical

<div align="center">Methodological factors</div>

Operationalization GNC

Measure type	The moderator distinguishes between three categories of GNC measures based on their content (as proposed by Hu et al., 2023).	coded from primary studies	(a) behavior-based (b) mixed (c) personality-based	Categorical
Developmental period	The moderator distinguishes between three categories of GNC measures based on the developmental phase they focus on.	coded from primary studies	(a) childhood (b) adolescence (c) adulthood	Categorical
Self- versus other-reports	The moderator distinguishes between two categories of GNC measures based on the type of report they use.	coded from primary studies	(a) self-report (b) other-report	Categorical
Retrospective versus present assessment	The moderator distinguishes between two categories of GNC measures based on the timing of the assessment.	coded from primary studies	(a) retrospective (b) current assessment	Categorical

Operationalization Mental

Health

Developmental Period	The moderator distinguishes between three categories of mental health measures based on the developmental phase they focus on.	coded from primary studies	(a) childhood (b) adolescence (c) adulthood	Categorical
Self- versus other-reports	The moderator distinguishes between two categories of mental health measures based on the type of report they use.	coded from primary studies	(a) self-report (b) other-report	Categorical
Retrospective versus present assessment	The moderator distinguishes between two categories of mental health measures based on the timing of the assessment.	coded from primary studies	(a) retrospective (b) current assessment	Categorical
Study Characteristics				
Study design	The moderator distinguishes between two categories of studies based on the study design.	coded from primary studies	(a) cross-sectional (b) longitudinal	Categorical
Publication year	The moderator represents the year the study was published.	coded from primary studies	not restricted	Continuous

Note. The table describes all moderators that were examined in the study. Database = indicates whether the moderator was coded from the primary studies or derived from an external source; range/levels = indicates possible values and levels of the moderator; type = indicates whether it is a categorical or continuous moderator.

nonsignificant intercept suggesting no evidence for impact from publication bias. When there is a significant intercept, PEESE is calculated using the squared standard errors as moderator. Here, the intercept provides a corrected effect estimate less affected by publication bias. Fifth, we used the 3-parameter section model (3PSM; Vevea & Hedges, 1995) at the single outcome level; this calculates the probability of observing a nonsignificant result relative to a significant finding based on the type-I-error threshold of statistical significance testing using an LRT (Rodger & Pustejovsky, 2021). A significant LRT provides evidence for the presence of publication bias.

For the 3-level models, we used available adaptations of those approaches presented by Fernández-Castilla et al. (2019)—that is, adapted versions of the Begg–Mazumdar rank correlation test (1994), Egger's regression test (Egger, 1997), the 3-level funnel plot test, and Duval and Tweedie's (2000) trim and fill method.

We also used moderator analyses to check whether the results from published studies significantly differed from the gray literature and unpublished data. A significant difference showing stronger associations in published studies might provide additional evidence for publication bias.

Sensitivity Analysis

We conducted sensitivity analyses on study quality, between-outcome correlations, and statistical aspects to check the robustness of our findings. First, to examine the impact of study quality, we limited our analyses to studies rated as "high quality" for the respective bias domain. Those analyses were performed separately for single bias domains and outcome types. The results of those analyses were compared with the results of our main analyses, with substantial divergence indicating that low study quality had a large impact.

Second, we examined whether between-outcome correlations significantly affected our results for mental distress. For this purpose, we varied between-outcome associations (ρ = .25; ρ =.65) when calculating the variance-covariance matrix for mental distress and examined whether the results and conclusions would have been different based on these associations.

Third, we used subgroup moderator analyses to examine the influence of the correlation method used (parametric vs. nonparametric correlations) and the correlation design (cross-sectional vs. longitudinal correlation) on the association between GNC and mental health.

Fourth, we controlled for the impact of a small number of clusters in our meta-analyses by re-calculating our main analyses on mental distress, self-esteem, body image problems, and rumination using bias-reduced linearization (Tipton, 2015) as the CR1 small-sample adjustment was discussed to be at risk to under-correct the small-sample bias (Pustojevsky & Tipton, 2018). The results of those analyses were compared with those of our main analyses using the CR1 small-sample adjustment.

3.4   Results

3.4.1   *Search Results*

We found a total of 5,247 records in the databases, of which 2,202 were removed as duplicates. Of these, 3,051 records were screened at the title/abstract level, and 755 records were screened at the full-text level. Another 27 records were identified via citation searching and personal communication. In total, we found 106 eligible studies (from 103 records). Figure 1 shows the flow chart for selecting studies in the review process.

Figure 1. *Flow of Study Reports Into The Research Synthesis*

Identification of studies via databases and registers		Identification of studies via other methods	

Identification

Records identified from:
Databases
(*k* = 5,247)
→
Records removed *before screening*:
Duplicate records removed
(*k* = 2,202)

Records identified from:
Citation searching
(*k* = 5,458)
Other sources: personal communication
(*k* = 4)

Screening

Records screened on abstract level
(*k* = 3,051)
→
Records excluded
(*k* = 2,280)

Reports sought for retrieval
(*k* = 771)
→
Reports excluded:
Reports not retrieved
(*k* = 7)

Reports sought for retrieval
(*k* = 293)
→
Reports excluded:
Reports not retrieved
(*k* = 4)
Reports already excluded
(*k* = 44)
Reports already included
(*k* = 42)
Unpublished conference contribution
(*k* = 5)

Reports assessed for eligibility
(*k* = 755)
→
Reports excluded:
Ineligible assessment
(*k* = 580)
Missing correlation
(*k* = 103)
Outcome reported in less than five studies
(*k* = 3)
Duplicate
(*k* = 1)

Reports assessed for eligibility
(*k* = 207)
→
Reports excluded:
Ineligible assessment
(*k* = 123)
Missing correlation
(*k* = 45)
Qualitative study
(*k* = 2)
Outcome reported in less than five studies

Included

Studies included in review
(*k* = 106)
Effect estimates included
(*e* = 489)
Participants included
(*n* = 102,429)

Note. This figure presents our review process and the flow of studies. It starts with the identification of studies using databases, registers, or other methods, continues through the screening process including abstract and full-text screening, and concludes with the final number of studies included. In accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Page et al., 2022) guidelines, the reasons for exclusion have only been documented for the full text level. *k* = number of studies; *e* = number of effect estimates; *n* = Number of participants.

3.4.2   Characteristics of Included Studies

A comprehensive overview of the included studies and their characteristics can be found in Table 2. Studies were published between 1979 and 2023, with 78.43% having been published from 2010 onwards. The studies came from 17 countries, with most of the studies being conducted in Western high-income countries in North America (USA: *k* = 56; Canada: *k* = 8) and Europe (e.g., Netherlands: *k* = 7; United Kingdom: *k* = 6; Germany: *k* = 6). The geographical distribution of evidence

is presented in Figure 2. All studies followed an observational design, with most studies being cross-sectional. Most studies were published, with all but one being written in English.

Figure 2. *Overview of Geographical Distribution of Primary Studies*

Note. This figure displays the geographical distribution of primary studies based on their frequency on a world map. The darker a country is shaded, the more studies from that country were included in the research synthesis.

3.4.2.1 Participants

The included studies comprised 489 effect estimates from 102,429 participants, averaged to 287 effect estimates when multiple effect estimates for a single outcome were combined. The sample sizes of primary studies varied between *n* = 25 (Drummond et al., 2018) and *n* = 14,684 (Warren et al., 2022). The mean age was 24.0 ± 10.7 years. The overall proportion of (mostly self-identified) men was 51.5%. Most samples were recruited in a nonclinical setting. On average, 18.8% of the samples identified as heterosexual, and 9.2% as sexual minorities. Information on ethnic identity was reported for 73 primary studies, with samples consisting of primarily Caucasian and White participants (44.7%), followed by Asian and Pacific Islanders (8.3%), Hispanic and Latinx (5.4%), and African American and Black (5.4%) individuals. Seventeen studies provided information on participants' income, and 56 studies reported on educational backgrounds (see SM-5 for details).

3.4.2.2 Operationalization and Assessment of GNC

The operationalization and measurement of GNC varied widely between studies. In total, 41 studies used behavior-based GNC measures, 53 studies used mixed measures, and 21 studies used personality-based measures (see Table 3 for an overview). Ten studies used more than one GNC measure type. The Childhood Gender Nonconformity Scale (k = 12; Bailey & Oberschneider, 1997), Recalled Childhood Gender Identity/Gender Role Questionnaire (k = 11; Zucker et al., 2006), Gender Identity Questionnaire for Children (k = 10; Johnson et al., 2004), Multidimensional Gender Identity Inventory (k = 10; Egan & Perry, 2001), Personal Attribute Questionnaire (k = 10; Helmreich et al., 1981), Bem Sex Role Inventory (k = 7; Bem, 1974), and Boyhood Gender Conformity Scale (k = 7; Hockenberry & Billingham, 1987) were the scales used most often (see SM-3 for details). Most studies used a single instrument to assess GNC (k = 87), while 19 studies employed two or more instruments.

3.4.2.3 Operationalization and Assessment of Mental Health

Included studies investigated the relationship between GNC and 13 mental health outcomes. Nine of these outcomes were categorized as indicators of mental distress: anxiety symptoms (k = 23), depressive symptoms (k = 54), general psychological distress (k = 26), externalizing and internalizing symptoms (k = 6), post-traumatic stress symptoms (k = 5), social anxiety symptoms (k = 11), substance use (k = 8), and suicidality (k = 11). We also found 29 studies reporting on self-esteem, 9 studies examining well-being, 6 studies assessing rumination, and 5 studies measuring body image problems.

3.4.2.4 Moderators

Table 3 summarizes the descriptive data for the moderator analyses.

Table 3. *Summary of Demographic and Moderator Variables*

Name	Total Absolute	Total Percent	Range	Mean	Median (IQR)
Number of studies					
Participants characteristics					
Number of participants	102,429				
Age *M±SD*	24.0±10.7				
Males	52,280	51.5%			
Sexual orientation					
Heterosexual	19,277	18.8%			
Sexual minorities	9,457	9.2%			
Not specified	364	0.4%			
Not reported	73,331	71.6%			
Ethnic identity					
Aboriginal	208	0.2%	0% to 5%	0%	0%
African American and Black	5,493	5.4%	0% to 100%	11%	4%
Arab	57	0.1%	0% to 2%	0%	0%
Asian and Pacific Islanders	8,486	8.3%	0% to 100%	10%	2%
Caribbean	58	0.1%	0% to 2%	0%	0%
Caucasian and White	45,784	44.7%	0% to 100%	64%	71%
Hispanic and Latinx	5,553	5.4%	0% to 54%	7%	1%
Indian	283	0.3%	0% to 92%	2%	0%
Native	178	0.2%	0% to 8%	0%	0%
Multiple Ethnic Identities	2,975	2.9%	0% to 22%	3%	0%
Other Ethnic Identities	4,630	4.5%	0% to 44%	5%	3%
Not Reported	28,723	28.0%	0% to 100%		
Cultural factors					
Country					
Australia	1	0.9%			
Austria	1	0.9%			
Belgium	1	0.9%			
Canada	8	7.5%			
China	4	3.8%			
Finland	2	1.9%			
Germany	6	5.7%			
India	1	0.9%			
Israel	2	1.9%			
Netherlands	7	6.6%			
(Northern) Ireland	1	0.9%			
Poland	1	0.9%			
Singapore	1	0.9%			
South Africa	2	1.9%			
Taiwan	1	0.9%			
United Kingdom	6	5.7%			
United States of America	56	52.8%			
Multiple Countries	4	3.8%			
Not Reported	1	0.9%			
Continent					
Africa	2	1.9%			
Asia	9	8.8%			
Europe	25	23.5%			
North America	64	59.8%			
South America	0	0.0%			
Oceania	1	1.0%			

Name	Total		Range	Mean	Median (IQR)
	Absolute	Percent			
Socioeconomic indices					
Country-level income					
Low Income	0	0.0%			
Lower-middle Income	1	0.9%			
Upper-middle Income	6	5.7%			
High Income	94	88.7%			
Not reported	5	4.7%			
Gross Domestic Product per capita [in $ 10,000]			2,257 to 100,172	59,283	70,249 (51,988 to 70,249)
Human Capital Index			.43 to .88	.72	.70 (.70 to .77)
Gender Equality					
Gender Gap Index			.63 to .86	.77	.77 (.77 to .77)
Social Institutions and Gender Index			7.7 to 46.9	20.1	20.10 (14.6 to 20.1)
Homophobic Climate Index			.13 to .68	.34	.36 (.34 to .36)
Cultural Dimensions					
Individualism			17.0 to 91.0	80.3	91.0 (80.0 to 91.0)
Masculinity			14.0 to 79.0	57.3	62.0 (62.0 to 62.0)
Uncertainty Avoidance			8.0 to 94.0	48.4	46.0 (46.0 to 48.0)
Indulgence			24.0 to 71.0	62.9	68.0 (68.0 to 68.0)
Power Distance			11.0 to 80.0	41.3	40.0 (38.0 to 40.0)
Long Term Orientation			21.0 to 93.0	40.0	26.0 (26.0 to 51.0)
Methodological Factors					
GNC assessment					
Measure type[a]					
Behavior-based	167	34.2%			
Mixed	190	38.9%			
Personality-based	127	26.0%			
Not assignable	5	1.0%			
Developmental period[a]					
Childhood	238	48.7%			
Adolescence	44	9.0%			
Adulthood	160	32.7%			
Mixed	47	9.6%			
Self- vs. other-reports[a]					
Self-report	422	86.3%			
Other-report	67	13.7%			
Retrospective vs. present assessment[a]					
Retrospective	118	31.4%			
Present	369	67.7%			
Mixed	2	0.4%			
Mental health assessment					
Developmental period[a]					
Childhood	114	23.3%			
Adolescence	51	10.4%			
Adulthood	302	61.8%			
Mixed	22	4.5%			
Self- vs .other-reports[a]					
Self-Report	418	85.5%			
Other-Report	70	14.3%			
Mixed	1	0.2%			
Retrospective vs. present assessment[a]					
Retrospective	0	0.0%			
Present	483	98.8%			
Not assignable	6	1.2%			

Name	Total Absolute	Percent	Range	Mean	Median (IQR)
Study characteristics					
Study design					
Cross-sectional	89	84.0%			
Longitudinal	17	16.0%			
Publication year			1979 to 2023	2012	2015 (2010 to 2019)
Publication status					
Published	98	92.5%			
Unpublished	8	7.5%			
Publication language					
English	105	99.1%			
German	1	0.9%			
Statistical characteristics					
Correlation type					
Parametric	419	85.7%			
Nonparametric	70	14.3%			
Cross-sectional vs. longitudinal Correlations					
Cross-sectional	454	92.8%			
Longitudinal	35	7.2%			

Note. This table summarizes the demographic data and the descriptive data of the moderator variables. GNC = gender nonconformity; IQR = interquartile range.

[a] Indicates the number of effect estimates for the respective moderator levels.

3.4.3 *Quality Appraisal and Risk-of-bias*

Overall, the studies included showed moderate to high quality (see Figure 3). Yet, most studies did not include a power calculation or rationale for sample size. Moreover, many studies did not report on participation rates or rates were below 50% of initially contacted participants (SM-7.2 for details).

Figure 3. *Summary of the Risk-of-bias Ratings Weighted by Sample Size*
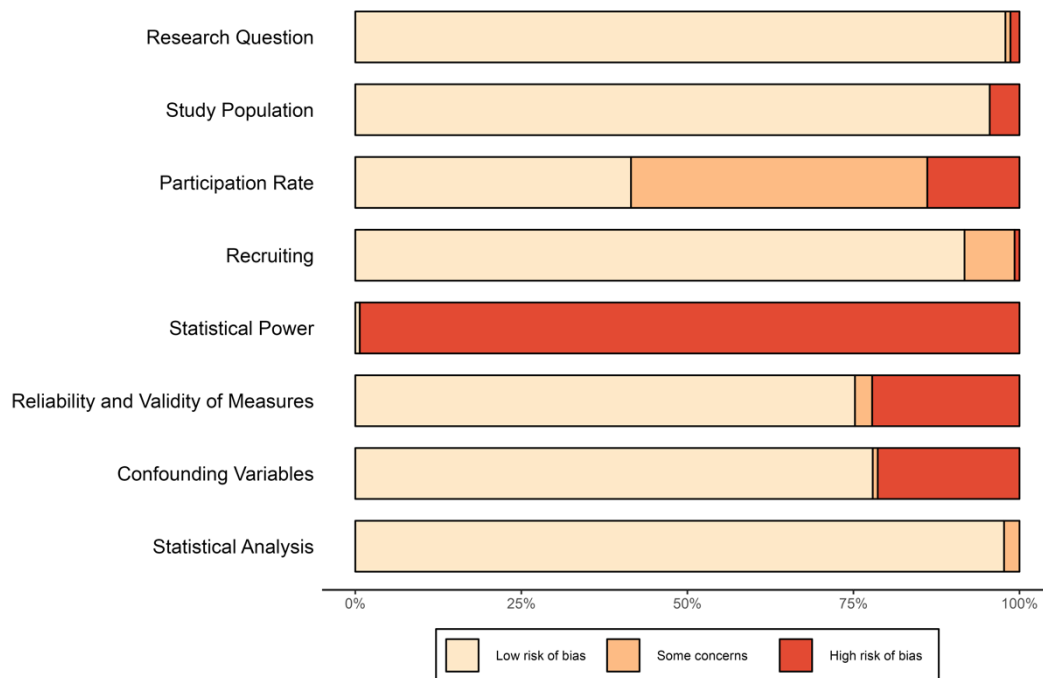
Note. This figure summarizes the results of the risk-of-bias analysis. The evaluation covered a total of eight domains. Studies were assigned to one of three categories based on their risk of bias: low risk of bias, some concerns, and high risk of bias. For the figure, the ratings were weighted according to the sample size.

3.4.4   Quantitative Summary of the Evidence

3.4.4.1   Main Analysis

An overview of results for the main analyses on mental distress, positive mental health, body image problems, and rumination is shown in Table 4.

GNC and Mental Distress. Eighty-five studies (210 effect estimates, 1 to 12 effect estimates per studies, 9 outcomes, 84,067 participants) were included in the 3-level meta-analysis of GNC and mental distress. Overall, we found a small association between GNC and mental distress—$M(r)$ = .09, 95% CI [.06, .12], 95% PI [−.21, .39], p < .001—that is, higher GNC was associated with greater mental distress. Heterogeneity was considerable, Q(209) = 3167.73, p < .001, I^2 = 94.12%. Heterogeneity was mainly driven by between-study differences, I^2_S = 81.84%, while between-outcome differences were of minor importance, I^2_O = 11.19%. The total random-effects variance was σ_{total} = .02, with a

Table 4. *Overview over Results of Meta-Analysis for Mental Health Outcomes*

Outcome	k	e	Estimates per Study Range	Estimates per Study Mean	M(r)	95% CI LL	95% CI UL	95% PI LL	95% PI UL	p	Q	df(Q)	p(Q)	I^2 (I^2_S, I^2_O)	σ^2 (σ^2_S, σ^2_O)
Mental Distress	85	210	1-12	2.47	.09	.06	.12	−.21	.39	< .001	3167.73	209	< .001	94.12	.02
														(80.71, 13.41)	(.02, .003)
Anxiety symptoms	23	33			.09	.04	.14	−.22	.39	< .001	-	-	-	-	-
Depressive symptoms	39	54			.09	.04	.14	−.22	.39	< .001	-	-	-	-	-
General psychological distress	26	45			.09	.04	.14	−.21	.39	< .001	-	-	-	-	-
Externalizing symptoms	6	14			.04	−.02	.09	-	-	.187	-	-	-	-	-
Internalizing symptoms	6	14			.06	.02	.10	-	-	.005	-	-	-	-	-
Post-traumatic stress symptoms	5	7			.21	.15	.22	-	-	< .001	-	-	-	-	-
Social anxiety symptoms	11	16			.06	.01	.11	−.25	.36	.033	-	-	-	-	-
Substance use	8	10			.14	.07	.21	-	-	< .001	-	-	-	-	-
Suicidality	11	17			.06	.01	.12	−.24	.37	.021	-	-	-	-	-
Self-Esteem	29	60	1-6	2.07	.08	−.02	.18	−.46	.62	.116	2402.48	28	<.001	96.60	.07
Wellbeing	9	13	1-2	1.44	.12	−.04	.28	-	-	.113	493.59	12	<.001	97.33	.04
Body Image Problems	5	7	1-2	1.40	−.10	−.28	.09	-	-	.227	39.06	6	<.001	82.02	.02
Rumination	6	12	1-3	2.00	.09	−.01	.18	-	-	.067	16.06	11	.139	60.03	.01

Note. This table summarizes the results of the main analysis on the relationship between gender nonconformity and mental health. Main analyses were separated into the outcome domains mental distress, self-esteem, wellbeing, body image problems and rumination. The category mental distress included the single symptom outcomes anxiety symptoms, depressive symptoms, externalizing symptoms, internalizing symptoms, post-traumatic stress symptoms, social anxiety symptoms, substance use, and suicidality. We have reported the 95% prediction intervals whenever at least 10 studies were included in the analysis (Deeks et al., 2019). k = number of studies; e = number of effects; M(r) = meta-analytically estimated effect; 95% CI = 95% confidence interval; 95% PI = 95% Prediction Interval; LL = lower limit; UL = upper limit; p = significance level; Q = test statistic for Cohen's Q test; df(Q) = degrees of freedom of the Cohen's Q test; p(Q) = significance level of Cohen's Q test test statistic; I^2 = I^2 statistic; I^2_S = I^2 statistic on between-study level; I^2_O = I^2 statistic on within-study level; σ^2 = total random-effect variance; σ^2_S = random-effect variance on between-study level, σ^2_O = random-effect variance on within-study level.

between-study variance of σ_{bs} = .02, 95% CI [.01, .03] and a within-study variance of σ_{ws} = .00, 95% CI [.00, .01]. Profile likelihood plots provided no evidence for overparameterization (see SM-8), and LRT provided evidence for the fit of the 3-level model above the reduced models (see Table 5).

Table 5. *Model Comparisons Between 3-Level and Reduced 2-Level Models in the Meta-Analysis for Mental Distress*

Model	*df*	AIC	BIC	logLik	LRT	*p*
Study-Level						
Full model	3	−68.24	−58.21	37.12		
Reduced model without study-level	2	−22.58	−15.90	13.29	47.65	< .001
Outcome-Level						
Full model	3	−68.24	−58.21	37.12		
Reduced model without outcome-level	2	197.97	204.65	−96.98	268.20	< .001

Note. This table shows the results of the likelihood-ratio-test to check the influence of the additional levels of the 3-level model on the model fit. Lower values of the model fit indices Akaike information criterion (AIC) and Bayesian information criterion (BIC) indicate a better model fit. *df* = degrees of freedom; logLik = log-likelihood; LRT = result of the likelihood ratio test, *p* = significance level.

We found a significant moderator effect of mental health outcomes in our analysis on mental distress, $F(8,76)$ = 4.65, $p < .001$, with significant heterogeneity, $Q(201)$ = 3,074.90, $p < .001$. The total random-effects variance was σ_{total} = .02, with a between-study variance of σ_{bs} = .02 and within-study variance of σ_{ws} = .003. In this model, post-traumatic stress symptoms differed significantly from the reference category anxiety symptoms, $M(r)$ = .13, 95% CI [.06, .20], $p < .001$, with posttraumatic stress having a stronger association with GNC. Looking at single outcome levels, significant small relationships were found between GNC and anxiety symptoms, depressive symptoms, general psychological distress, internalizing symptoms, post-traumatic stress symptoms, social anxiety symptoms, substance use, and suicidality (see Table 4). The correlations varied between *M(r)* = .06, 95% CI [.02, .10] for internalizing symptoms and *M(r)* = .21, 95% CI [0.15, 0.22] for post-traumatic stress symptoms. There was no evidence for a significant association only for externalizing symptoms, *M(r)* = .04, 95% CI [−.02, .09], $p = .187$.

GNC and Positive Mental Health. We planned to conduct a 3-level model for positive mental health as well; however, profile likelihood plots without single peaks provided evidence for overparameterization (see SM-7). We therefore performed separate meta-analyses for self-esteem and well-being.

GNC and Self-Esteem. Twenty-nine studies (60 effect estimates, 1 to 6 effect estimates per study, 22,170 participants) were included in the meta-analysis of the association between GNC and self-esteem. Overall, we found a small nonsignificant association, $M(r)$ = .08, 95% CI [−.02, .20], 95% PI [−.46, .62] p = .116, with substantial heterogeneity, $Q(28)$ = 2402.48, $p < .001$, I^2 = 96.60%. The between-study variance was σ = .07.

GNC and Well-being. Nine studies (13 effect estimates, 1 to 2 effect estimates per study, 15,221 participants) were included in the analysis on the relationship between GNC and well-being, which provided no evidence for a significant association, $M(r)$ = .12, 95% CI [−.04, .28], p = .113, with considerable heterogeneity, $Q(12)$ = 493.59, $p < .001$, I^2 = 97.33%. The between-study variance was at σ = .04.

GNC and Body Image Problems. Five studies (6 effect estimates, 1 to 2 effect estimates per study, 1,770 participants) were included in the analysis on GNC and body image problems. We found no evidence for a significant association, $M(r)$ = −.10, 95% CI [−.28, .09], p = 0.151, in presence of substantial between-study heterogeneity, $Q(5)$ = 21.86, p = .001, I^2 = 75.36% and between-study variance, σ = .02.

GNC and Rumination. Six studies (12 effect estimates, 1 to 3 effect estimates per study, 5,946 participants) were included in the analysis on GNC and rumination. We found no significant association, $M(r)$ = .09, 95% CI [−.01, .18], p = .067, and no significant between-study heterogeneity, $Q(11)$ = 16.06, p = .139, I^2 = 60.03%. The between-study variance was σ^2 = .01.

3.4.4.2   Moderator Analysis: Mental Distress

An overview of the results of the moderator analyses for mental distress can be found in Tables 7.

GNC Measure Type. First, we identified a significant moderator effect for GNC measure type, $Q_M(2,80) = 5.46$, $p = .006$. We found a significant small positive relationship between GNC and greater mental distress for behavior-based and mixed GNC measures, $M(r) = .12$, 95% CI [.06, .17], 95% PI [−.11, .34], $p < .001$ and $M(r) = .11$, 95% CI [.06, .16], 95% PI [−.12, .34], $p < .001$, respectively, which suggests that greater GNC was related to more severe mental distress. By contrast, for personality-based GNC measures, a small, yet nonsignificant negative association between GNC and mental distress emerged, $M(r) = −.09$, 95% CI [−.19, .02], 95% PI [−.34, .16], $p = .109$. The LRT also provided evidence that the inclusion of GNC measure type increased model fit (see Table 7). Based on these findings, we decided to include this moderator in further moderator analyses whenever possible by including additional moderators in models already including GNC measure type. In these models, we examined both main and interaction effects.

Table 6. *Comparison of Meta-Analytic Models on Mental Distress With and Without 'GNC Measure Type'*

Model	df	AIC	BIC	logLik	LRT	p
Model with GNC measure type	5	−109.25	−92.17	−108.98		
Model without GNC measure type	3	−88.20	−77.92	−88.09	25.06	< .001

Note. This table shows the results of the likelihood-ratio-test to check the influence of the moderator GNC measure type on the model fit. Lower values of the model fit indices Akaike information criterion (AIC) and Bayesian information criterion (BIC) indicate a better model fit. *df* = degrees of freedom; logLik = log-likelihood; LRT = result of the likelihood ratio test; *p* = significance level.

Table 7. *Overview over Results of Conjoint Moderator Analysis for Mental Distress*

Moderator	k	e	Range	Mean	M(r)	β	95% CI LL	95% CI UL	95% PI LL	95% PI UL	F / t	df	p
						Cultural factors							
Geographical differences													
Continent[a]	30	75	1-6	2.50	-	0.004	−0.06	0.07	-	-	0.02	(1, 28)	.905
Estimates:													
Europe[b]	9	30	2-6	3.33	.09	-	.03	.14	-	-	2.97	28	.006
North America	21	45	1-6	2.29	.09	-	.02	.24	−.05	0.23	5.66	28	< .001
Socioeconomic indices													
GDP per Capita	42	111	1-6	2.64	-	-	-	-	-	-	8.19	(3, 38)	<.001
GDP per Capita	42	111	-	-	-	−0.004	−0.02	0.01	-	-	−0.77	38	.449
GNC-type	42	111	-	-	-	−0.39	−1.02	0.24	-	-	−1.26	38	.215
GDP per Capita x GNC-type	42	111	-	-	-	0.003	−0.01	0.01	-	-	0.61	38	.545
Human Capital Index	42	111	1-6	2.64	-	-	-	-	-	-	11.45	(3, 38)	<.001
Human Capital Index	42	111	-	-	-	0.001	−0.72	0.72	-	-	0.002	38	.999
GNC-type	42	111	-	-	-	1.42	−0.24	3.09	-	-	1.73	38	.092
Human Capital Index x GNC-type	42	111	-	-	-	−2.25	−4.55	0.04	-	-	−1.99	38	.054
Gender equality													
Gender Gap Index (GGI)	42	111	1-6	2.64	-	-	-	-	-	-	80.62	(3, 38)	<.001
GGI	42	111	-	-	-	0.03	−0.98	1.03	-	-	0.05	38	.960
GNC-type	42	111	-	-	-	5.36	3.36	7.36	-	-	5.42	38	<.001
GGI x GNC-type	42	111	-	-	-	−7.17	−9.69	−4.64	-	-	-5.74	38	<.001
Social Institute and Gender Index (SIGI)	42	111	1-6	2.64	-	-	-	-	-	-	83.89	(3, 38)	<.001
SIGI	42	111	-	-	-	0.01	−0.004	0.01	-	-	1.10	38	.279
GNC-type	42	111	-	-	-	−0.92	−1.20	−0.64	-	-	−6.69	38	<.001
SIGI x GNC-type	42	111	-	-	-	0.04	0.02	0.06	-	-	4.57	38	<.001
Homophobia													
Homophobic Climate Index	42	111	1-6	2.64	-	-	-	-	-	-	7.80	(3, 38)	<.001
Homophobic Climate Index	42	111	-	-	-	0.22	−0.13	0.56	-	-	1.27	38	.210
GNC-type	42	111	-	-	-	−0.11	−0.59	0.38	-	-	−0.45	38	.657
Homophobic Climate Index x GNC-type	42	111	-	-	-	−0.30	−1.84	1.23	-	-	−0.40	38	.692

Moderator	k	e	Estimates per study Range	Estimates per study Mean	M(r)	β	95% CI LL	95% CI UL	95% PI LL	95% PI UL	F / t	df	p
Cultural dimensions													
Individualism	42	111	1-6	2.64	-	-	-	-	-	-	82.97	(3, 38)	<.001
Individualism	42	111	-	-	-	−0.02	−0.02	−0.01	-	-	−5.36	38	<.001
GNC-type	42	111	-	-	-	−1.27	−1.58	−0.95	-	-	−8.11	38	<.001
Individualism x GNC-type	42	111	-	-	-	0.01	0.01	0.02	-	-	6.25	38	<.001
Masculinity	42	111	1-6	2.64	-	-	-	-	-	-	11.29	(3, 38)	<.001
Masculinity	42	111	-	-	-	−0.001	−0.003	0.001	-	-	−1.09	38	.281
GNC-type	42	111	-	-	-	0.76	−0.77	2.28	-	-	1.01	38	.320
Masculinity x GNC-type	42	111	-	-	-	−0.02	−0.04	0.01	-	-	−1.29	38	.205
Uncertainty avoidance	42	111	1-6	2.64	-	-	-	-	-	-	27.48	(3, 38)	<.001
Uncertainty avoidance	42	111	-	-	-	0.003	0.001	0.01	-	-	3.55	38	.001
GNC-type	42	111	-	-	-	0.33	−0.15	0.80	-	-	1.39	38	.174
Uncertainty avoidance x GNC-type	42	111	-	-	-	−0.01	−0.02	−0.002	-	-	−2.54	38	.015
Indulgence	42	111	1-6	2.64	-	-	-	-	-	-	69.46	(3, 38)	<.001
Indulgence	42	111	-	-	-	−0.02	−0.02	-0.01	-	-	−5.17	38	<.001
GNC-type	42	111	-	-	-	−0.96	−1.19	-0.73	-	-	−8.41	38	<.001
Indulgence x GNC-type	42	111	-	-	-	0.01	0.01	0.02	-	-	6.05	38	<.001
Power distance	42	111	1-6	2.64	-	-	-	-	-	-	18.63	(3, 38)	<.001
Power distance	42	111	-	-	-	−0.03	−0.04	−0.01	-	-	−2.63	38	.012
GNC-type	42	111	-	-	-	−1.24	−1.96	−0.53	-	-	−3.52	38	.001
Power distance x GNC-type	42	111	-	-	-	0.03	0.01	0.05	-	-	2.93	38	.006
Long-term orientation	42	111	1-6	2.64	-	-	-	-	-	-	54.28	(3, 38)	<.001
Long-term orientation	42	111	-	-	-	0.001	−0.003	0.01	-	-	0.45	38	.652
GNC-type	42	111	-	-	-	−0.04	−0.22	0.13	-	-	−0.50	38	.619
Long-term orientation x GNC-type	42	111	-	-	-	−0.01	−0.01	−0.0004	-	-	−2.22	38	.032
Individual factors													
Gender									-	-			
Percentage of men	46	119	1-6	2.59	-	-	-	-	-	-	13.06	(3, 42)	<.001
Gender	46	119	-	-	-	0.001	−0.0001	0.002	-	-	−0.26	42	.798
GNC-type	46	119	-	-	-	−0.25	−0.36	−0.13	-	-	−4.43	42	<.001
Gender x GNC-type	46	119	-	-	-	0.001	−0.0002	0.002	-	-	1.68	42	.101

Comparison of men and women samples	28	83	1-6	2.96	-	-	-	-	-	-	9.739	(3, 24)	<.001
Gender	28	83	-	-	-	0.07	−0.02	0.15	-	-	1.62	24	.119
GNC-Type	28	83	-	-	-	−0.25	−0.39	−0.10	-	-	−3.50	24	.002
Gender x GNC-Type	28	83	-	-	-	0.09	−0.03	0.20	-	-	1.58	24	.127
Estimates:								-	-			
Women x behavior[b]	11	20	1-3	1.82	.04	-	−.01	.09	−.15	.24	1.70	-	.089
Women x personality	11	16	1-2	1.45	−.21	-	−.27	−.14	−.40	−.01	−6.50	-	<.001
Men x behavior	15	30	1-4	2.00	.11	-	.06	.16	−.09	.31	4.50	-	<.001
Men x personality	12	17	1-2	1.42	−.05	-	−.11	.01	−.25	.15	−1.55	-	.122
Gender (identity)													
Gender minority vs. majority[a]	34	83	1-6	2.44	-	−0.07	−0.21	0.08	-	-	0.92	(1, 32)	.345
Estimates:													
Gender majority samples[b]	29	73	1-6	2.52	.09	-	.06	.11	−.06	.23	6.27	32	<.001
Gender minority samples	5	10	1-3	2.00	.02	-	−.12	.16	-	-	0.26	32	.793
Sexual orientation	19	48	1-6	2.53	-	-	-	-	-	-	-	-	-
Sexual orientation	19	48	-	-	-	−0.0003	−0.0009	0.0003	-	-	0.79	15	.440
GNC-type	19	48	-	-	-	−0.07	−0.12	−0.02	-	-	−2.97	15	.010
Sexual orientation x GNC-type	19	48	-	-	-	−0.001	−0.001	−0.0001	-	-	−2.54	15	.023
Ethnic identity													
African American and Black	31	69	1-6	2.23	-						24.79	(3, 27)	< .001
Ethnic identity	31	69	-	-	-	0.40	0.11	0.69	-	-	2.82	27	.009
GNC-type	31	69	-	-	-	−0.13	−0.21	−0.05	-	-	−3.23	27	.003
Ethnic identity x GNC-type	31	69	-	-	-	−0.19	−0.42	0.03	-	-	−1.76	27	.090
Asian	31	69	1-6	2.23	-						21.20	(3, 27)	< .001
Ethnic identity	31	69	-	-	-	1.32	−0.96	3.60	-	-	1.19	27	.245
GNC-type	31	69	-	-	-	−0.02	−0.20	−0.04	-	-	−2.98	27	.006
Ethnic identity x GNC-type	31	69	-	-	-	−0.74	−1.90	0.42	-	-	−1.31	27	.202
Caucasian and White	34	76	1-6	2.24	-						21.26	(3,30)	< .001
Ethnic identity	34	76	-	-	-	−0.12	−0.23	0.0001	-	-	−2.04	30	.050
GNC-type	34	76	-	-	-	−0.24	−0.35	-0.13	-	-	−4.33	30	< .001
Ethnic identity x GNC-type	34	76	-	-	-	0.14	−0.06	0.35	-	-	1.42	30	.352

	k	%	Range	M								df	p
Hispanic and Latinx	31	69	1-6	2.23	-	-	-	-	-	-	18.29	(3, 27)	< .001
Ethnic identity	31	69	-	-	-	0.02	−0.90	0.94	-	-	0.04	27	.965
GNC-type	31	69	-	-	-	−0.14	−0.24	−0.05	-	-	−3.14	27	.004
Ethnic identity x GNC-type	31	69	-	-	-	0.01	−0.98	0.98	-	-	0.01	27	.991
Participants' age	35	95	1-6	2.71	-	-	-	-	-	-	22.28	(3, 31)	<.001
Participants' age	35	95	-	-	-	0.01	−0.01	0.01	-	-	1.00	31	.324
GNC-type	35	95	-	-	-	−0.11	−0.27	0.05	-	-	−1.44	31	.159
Participants' age x GNC-type	35	95	-	-	-	0.004	−0.01	0.004	-	-	−0.96	31	.343
Sample type													
Nonclinical vs. clinical samples[a]	32	78	1-6	2.44	-	−0.03	−0.09	0.03	-	-	−1.13	(1, 30)	.267
Estimates:					-								
Nonclinical samples[b]	28	65	1-6	2.42	.08	-	.06	.11	−.05	.21	6.37	30	< .001
Clinical samples	7	13	1-6	2.50	.05	-	-.01	.11	-	-	1.75	30	.090
Methodological factors													
Assessment of GNC													
Self- vs. other-reports[a]	34	87	1-6	2.56	-	−0.03	−0.05	-0.02	-	-	36.35	(1, 32)	< .001
Estimates:													
Self-report	23	57	1-6	2.48	.07	-	.04	.10	−.08	.22	4.75	32	< .001
Other report[b]	13	30	1-6	2.37	.10	-	.08	.13	−.04	.25	7.19	32	< .001
Retrospective vs. present GNC[a]	33	81	1-6	2.45	-	0.04	−0.01	0.09	-	-	2.59	(1, 31)	.118
Estimates:													
Retrospective	18	45	1-6	2.50	.06	-	.06	.13	−.07	.18	4.91	31	< .001
Present[b]	15	36	1-6	2.40	.10	-	.03	.09	−.04	.23	3.69	31	< .001
Assessment of mental health													
Developmental period[a]	31	79	1-6	2.55	-	−0.03	−0.09	0.02	-	-	1.80	(1, 29)	.190
Estimates:													
Childhood	12	30	1-6	2.50	.05	-	.02	.09	−.09	.19	3.36	29	.002
Adulthood[b]	19	49	1-6	2.58	.09	-	.05	.13	−.05	.23	4.47	29	< .001
Self- vs. other-reports[a]	33	82	1-6	2.48	-	0.04	−0.01	0.08	-	-	2.70	(1, 31)	.110
Estimates:													
Self-report	23	56	1-6	2.43	.09	-	.06	.13	−.09	.20	5.46	31	< .001
Other-report[b]	11	26	1-4	2.36	.06	-	.02	.09	−.05	.24	3.18	31	.003

	k	e		M(r)	ß	LL	UL			F / t	df	p
Publication year	45	115	1-6	2.56	-	-	-	-	-	8.07	(3, 41)	<.001
Publication year	45	115	-	-	−0.00002	−0.01	0.01	-	-	−0.01	41	.744
GNC-type	45	115	-	-	3.85	−12.30	20.00	-	-	0.48	41	.633
Publication year x GNC-type	45	115	-	-	−0.002	−0.01	0.01	-	-	−0.51	41	.614

Note. This table summarizes the results of the moderator analysis for mental distress. The results of the omnibus moderator tests are reported in the line of the respective moderator, with main and interaction effects provided in the corresponding rows below. The estimates for individual moderator levels were derived from models without intercepts. Moderator tests that were not reported in the table could not be performed due to an insufficient number of studies (for an overview see SM-6). GNC = gender nonconformity; k = number of studies; e = number of effects; $M(r)$ = meta-analytically estimated effect; ß = regression coefficient/slope; *95% CI* = 95% confidence interval; UL = upper limit; LL = lower limit; *F / t* = test statistic for regression coefficient or effect estimate; *df* = degrees of freedom of the test statistic; *p* = significance level.

[a] These analyses were conducted only for behavior-based GNC measures because there were not enough studies available for personality-based GNC measures.

[b] Reference group used for the omnibus moderation test. Estimates for single moderator levels were derived from models without intercepts.

Cultural Moderators

Geographical and Socioeconomic Differences. As all studies were conducted in high-income countries, we were unable to perform analyses on country-level income group. Analyses of the regional distribution across continents were limited to behavior-based measures due to missing evidence for personality-based measures. We found no evidence for a moderator effect for behavior-based measures, β = 0.004, 95% CI [−0.06, 0.07], $F(1, 28)$ = 0.02, p = .905. Further analyses for socioeconomic factors did not reveal any significant moderator effect (see Table 7).

Gender (In)Equality. We found a significant interaction effect between Gender Gap Index (GGI) and GNC measure type, β = −7.17, 95% CI [−9.69, −4.64], $t(38)$ = −5.74, p < .001. For behavior-based GNC measures, there was no link between GGI and effect estimates, while effect estimates decreased with increasing gender equality for personality-based GNC measures. For those measures, higher GNC was associated with better mental health (see Figure 4).

Similarly, for the SIGI we found a significant interaction effect with GNC measure type, β = 0.04, 95% CI [0.02, 0.06], $t(38)$ = 4.57, p < .001. When gender equality was higher, the relationship between personality-based GNC measures and mental distress decreased. However, we found no association with gender equality for behavior-based GNC measures (see Figure 4).

Figure 4. *The Moderation Effect of the Gender Gap Index (GGI) and the Social Institutions and Gender Index (SIGI) on the Relationship between GNC and Mental Distress*
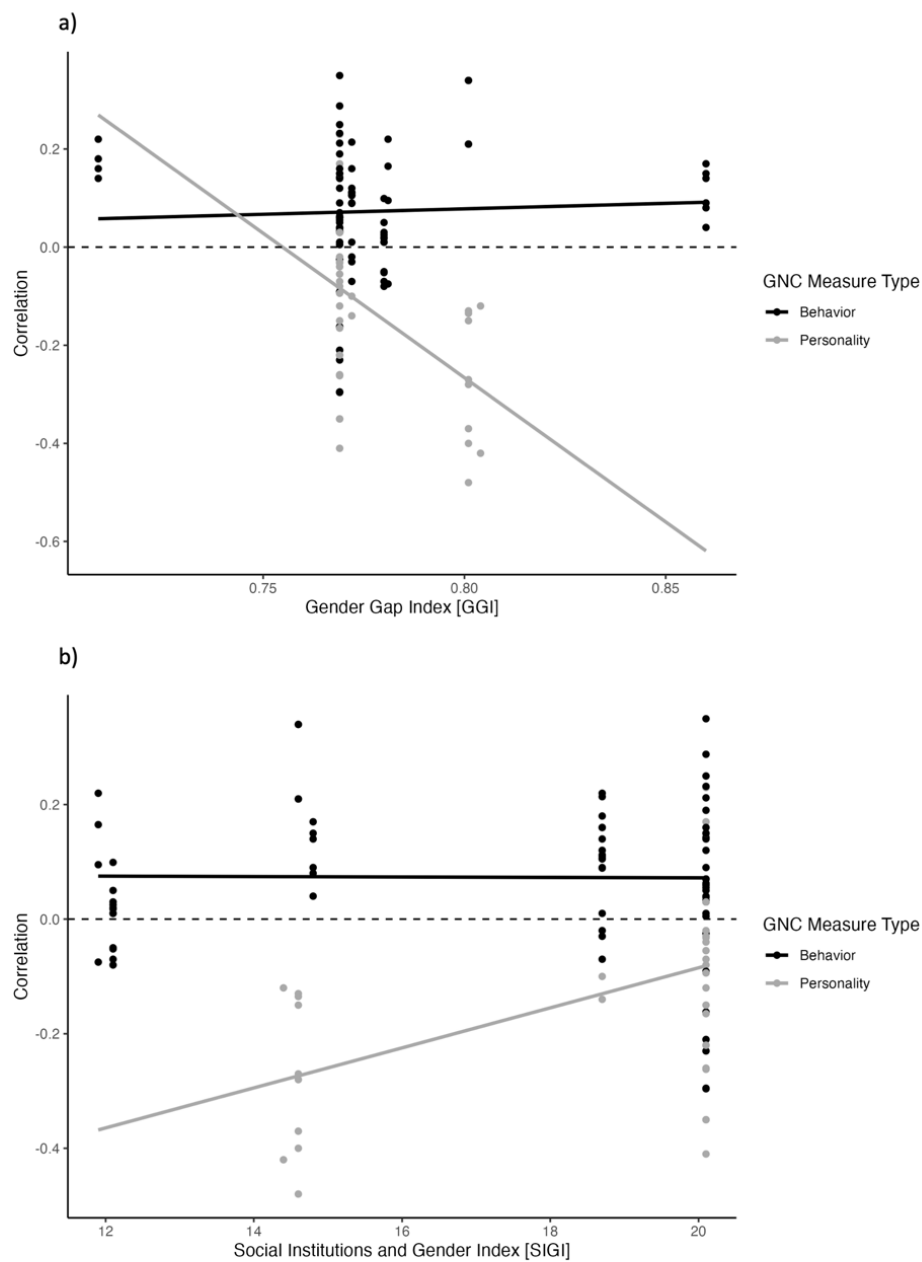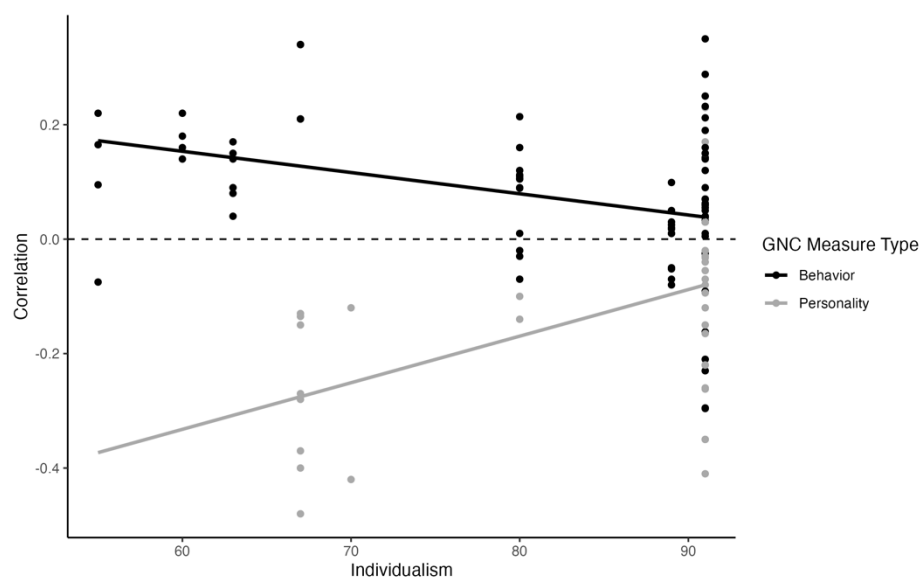

Note. This figure shows the influence of the (a) Gender Gap Index (GGI) and the (b) Social Institutions and Gender Index (SIGI) on the relationship between gender nonconformity (GNC) and mental distress for behavior-based (black) and personality-based (grey) GNC measures. The dots reflect the correlations of the individual samples, and the lines are the respective regression lines. The correlations are coded in such a way that higher values indicate a greater association between higher levels of GNC and poorer mental health. Higher levels of GGI and lower levels of SIGI represent more gender equality.

Cultural Dimensions.

For **individualism**, we found a significant interaction effect between individualism and GNC measure type, β = 0.01, 95% CI [0.01, 0.02], t(38) = 6.25, p < .001. For behavior-based GNC measures, the link between GNC and mental distress was smaller with increasing individualism, while higher levels of individualism were associated with more negative associations of personality-based GNC and mental distress—that is, in more individualistic cultures, greater personality-based GNC was associated with better mental health (see Figure 5).

Figure 5. *The Moderation Effect of Individualism on the Relationship between GNC and Mental Distress*

Note. This figure shows the influence of the cultural dimension individualism on the relationship between gender nonconformity (GNC) and mental distress for behavior-based (black) and personality-based (grey) GNC measures. The dots reflect the correlations of the individual samples, and the lines are the respective regression lines. The correlations are coded in such a way that higher values indicate a greater association between higher levels of GNC and poorer mental health.

For **uncertainty avoidance**, we also found a significant interaction between uncertainty avoidance and GNC measure type, β = −0.01, 95% CI [−0.02, −0.001], $t(38)$ = −2.54, p = .015. For behavior-based measures, cultures with higher levels of uncertainty avoidance were associated with increasing correlations between GNC and mental distress. For personality-based measures, effect estimates became more negative with increasing uncertainty avoidance—that is, in societies with higher uncertainty avoidance, higher personality-based GNC was associated with better mental health (see Figure 6).
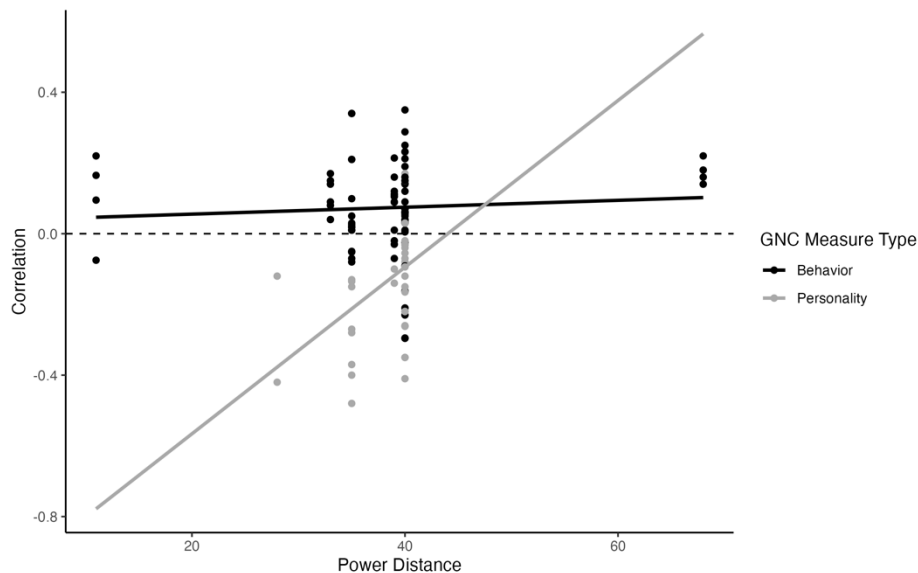
Figure 6. *The Moderation Effect of Uncertainty Avoidance on the Relationship between GNC and Mental Distress*

Note. This figure shows the influence of the cultural dimension uncertainty avoidance on the relationship between gender nonconformity (GNC) and mental distress for behavior-based (black) and personality-based (grey) GNC measures. The dots reflect the correlations of the individual samples, and the lines are the respective regression lines. The correlations are coded in such a way that higher values indicate a greater association between higher levels of GNC and poorer mental health.

In case of **power distance**, both main effects as well as the interaction effect, β = 0.03, 95% CI [0.01, 0.05], *t*(38) = 2.93, *p* = .006, were significant. For behavior-based GNC measures, there was no association between power distance and effect estimates. By contrast, greater power distance was associated with less negative effect estimates for personality-based measures—that is, in cultures with greater power distance, the link between higher personality-based GNC and better mental health became weaker (see Figure 7).

Figure 7. *The Moderation Effect of Power Distance on the Relationship between GNC and Mental Distress*

Note. This figure shows the influence of the cultural dimension power distance on the relationship between gender nonconformity (GNC) and mental distress for behavior-based (black) and personality-based (grey) GNC measures. The dots reflect the correlations of the individual samples, and the lines are the respective regression lines. The correlations are coded in such a way that higher values indicate a greater association between higher levels of GNC and poorer mental health.

For **long-term orientation** as well, we found a significant interaction effect with GNC

measure type, β = −0.01, 95% CI [−0.01, −0.0004], *t*(38) = −2.22, *p* = .032. More long-term orientation

was associated with increasing associations between GNC and mental distress for behavior-based

measures, while the link became more negative for personality measures—that is, in cultures with

stronger long-term orientation, higher personality-based GNC was associated with better mental

health (see Figure 8).

Figure 8. *The Moderation Effect of Long Term Orientation on the Relationship between GNC and*
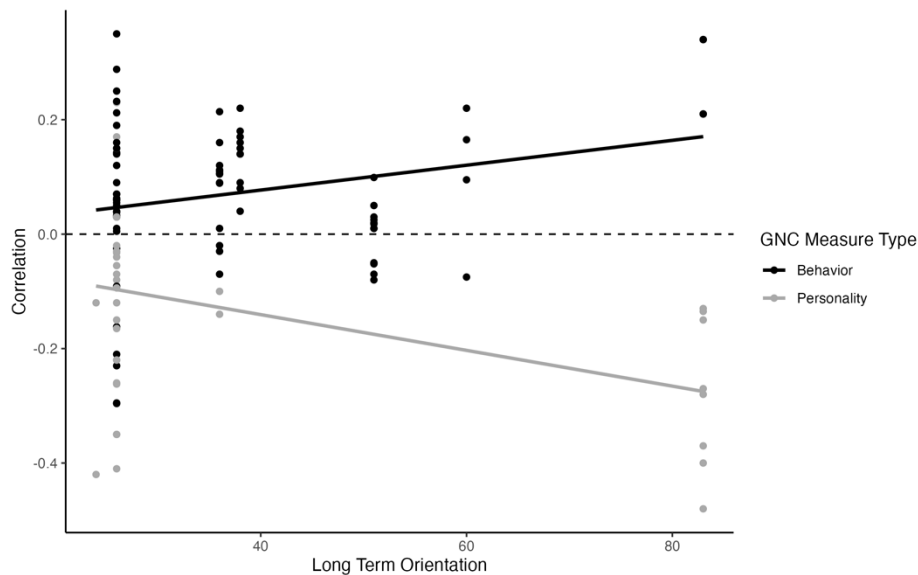
Mental Distress

Note. This figure shows the influence of the long term orientation on the relationship between gender nonconformity
(GNC) and mental distress for behavior-based (black) and personality-based (grey) GNC measures. The dots reflect the
correlations of the individual samples, and the lines are the respective regression lines. The correlations are coded in such a
way that higher values indicate a greater association between higher levels of GNC and poorer mental health.

The interaction effect of **indulgence** and GNC measure type was significant, β = 0.01, 95% CI [0.01, 0.02], *t*(38) = 6.05, *p* < .001. For both measure types, effect estimates became numerically smaller with increasing levels of indulgence; however, lower levels of indulgence were associated with more positive effect estimates for behavior-based measures and more negative effect estimates for personality-based measures (see Figure 9).

Figure 9. *The Moderation Effect of Indulgence on the Relationship between GNC and Mental Distress*
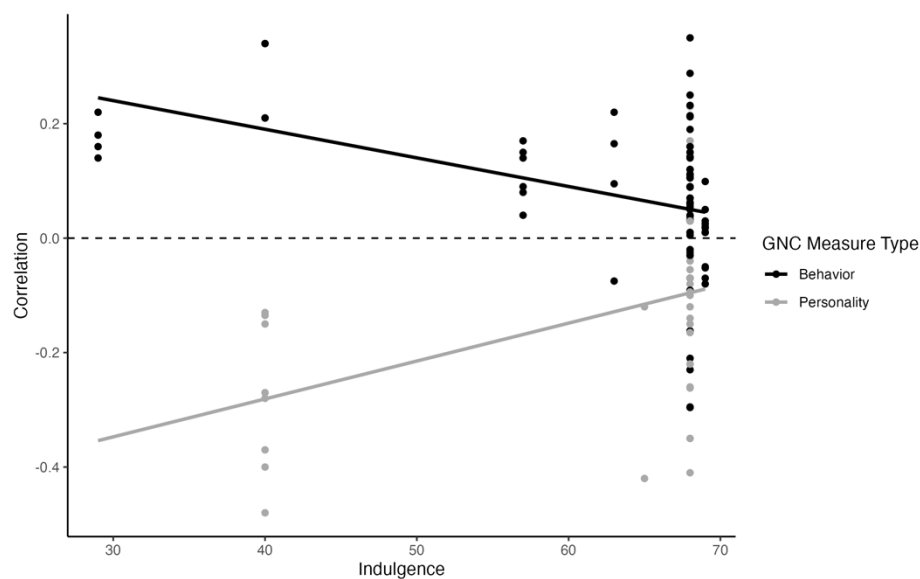
Note. This figure shows the influence of the cultural dimension indulgence on the relationship between gender nonconformity (GNC) and mental distress for behavior-based (black) and personality-based (grey) GNC measures. The dots reflect the correlations of the individual samples, and the lines are the respective regression lines. The correlations are coded in such a way that higher values indicate a greater association between higher levels of GNC and poorer mental health.

Individual Moderators

Gender. We did not find a significant interaction effect with gender for either type of GNC measure, nor was there a main effect of gender. Moreover, we found no moderator effect for gender minority samples (see Table 7).

Sexual Orientation. For sexual orientation, we found a significant, yet small interaction of sexual orientation and GNC measure type, β = −0.001, 95% CI [−0.001, −0.0001], *t*(15) = −2.54, *p* =

.023. For personality-based GNC measures, we found decreasing correlations for samples comprising more heterosexual participants, while there was no association with effect estimates for behavior-based measures (see Figure 10). There was also no evidence for a main effect of sexual orientation.

Figure 10. *The Moderation Effect of the Proportion of Heterosexuals in the Sample on the Relationship between GNC and Mental Distress*
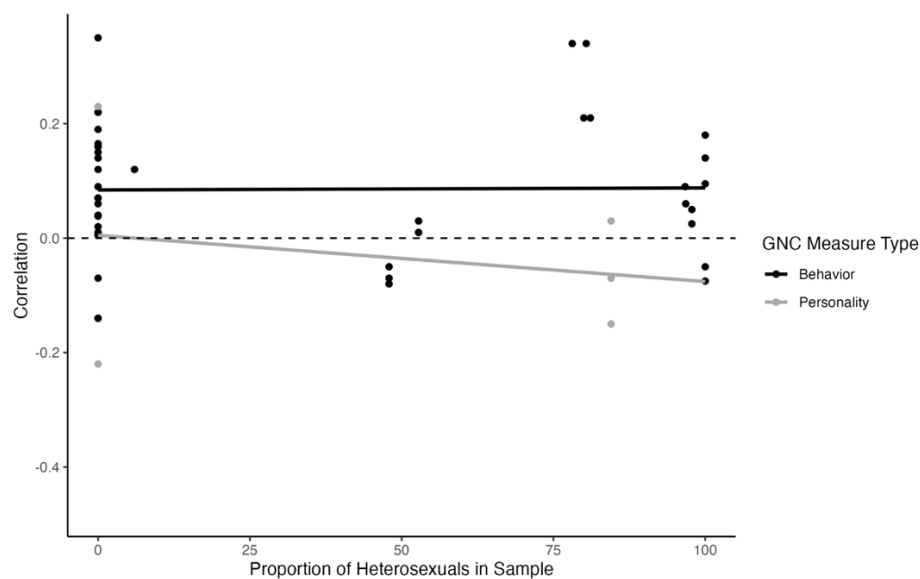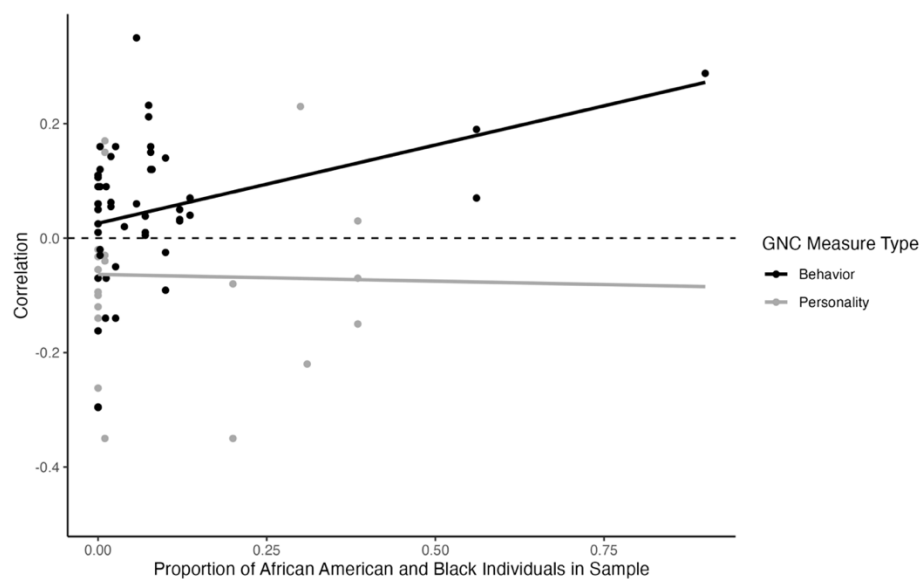

Note. This figure shows the influence of the proportion of heterosexual participants on the relationship between gender nonconformity (GNC) and mental distress for behavior-based (black) and personality-based (grey) GNC measures. The dots reflect the correlations of the individual samples, and the lines are the respective regression lines. The correlations are coded in such a way that higher values indicate a greater association between higher levels of GNC and poorer mental health.

Ethnic Identity. We found a significant main effect for ethnic identity when we examined the proportion of African American and Black participants, $\beta = 0.40$, 95% CI [0.11, 0.69], $t(27) = 2.82$, $p = .009$. Effect estimates increased with rising proportions of African American and Black individuals—that is, when African American and Black individuals represented larger proportions of the sample there was a stronger association between GNC and higher mental distress (see Figure 11). We found no significant interaction effect with GNC measure type, $\beta = -0.19$, 95% [−0.42, 0.03], $t(27) = -1.76$, $p = .090$. Further moderator analyses on ethnic identity did not reach significance. However, the main

effect for the proportion of Caucasian and White participants was close to significance, β = −0.12, 95% CI [−0.23, 0.0001], $t(30)$ = −2.04, p = .005. Moreover, we were unable to examine moderator effects for some ethnic identities (e.g., Percentage of Aboriginal participants) due to a small number of studies reporting on the respective group (see SM-6).

Figure 11. *The Moderation Effect of the Proportion of African American and Black Individuals in the Sample on the Relationship between GNC and Mental Distress*

Note. This figure shows the influence of the proportion of African American and Black individuals in the sample on the relationship between gender nonconformity (GNC) and mental distress for behavior-based (black) and personality-based (grey) GNC measures. The dots reflect the correlations of the individual samples, and the lines are the respective regression lines. The correlations are coded in such a way that higher values indicate a greater association between higher levels of GNC and poorer mental health.

Participants' Age. We found no moderating effect of mean sample age on the relationship between GNC and mental distress.

Clinical versus Nonclinical Samples. Due to the limited number of studies using personality-based measures, we examined the impact of sample type for behavior-based measures. No differences were found between nonclinical and clinical samples (see Table 7).

Methodological Moderators. The number of studies was too small to allow joint analyses for most of the methodological moderators, including GNC measure type. For publication year, such a model provided no evidence for either a main effect of publication year or an interaction with GNC measure type.

For other moderators, analyses were limited to behavior-based measures, as the number of studies employing personality-based measures was too small. In those analyses, we found a significant moderation by type of report (self- vs. other-reported GNC), $\beta = -0.03$, 95% [−0.05, 0.02], $F(1,32) = 36.35$, $p < .001$ with other-person reports showing greater effect estimates, M(r) = .10, 95% CI [.08, .13], p < .001—that is, when other-reports were used, higher levels of GNC showed a stronger association with mental distress (see Table 7).

3.4.4.3 Moderator Analysis: Self-Esteem

An overview of all results of the moderator analysis for self-esteem can be found in Table 8. Again, we found significant moderation by GNC measure type, $Q_M(1,26) = 38.30$, $p < .001$, with results showing a similar pattern for mental distress. Behavior-based and mixed GNC measures showed a significant small positive association, *M(r)* = .16, 95% CI [−.20, .51], 95% PI [.07, .24], $p < .001$ and *M(r)* = .23, 95% CI [.15, .32], 95% PI [−.13, .59], $p < .001$, respectively—that is, higher levels of behavior-based GNC were associated with poorer self-esteem. For personality-based GNC measures, we found the opposite pattern, *M(r)* = −.25, 95% CI [−.36, −.14], 95% PI [−.61, .12], $p < .001$, with higher personality-based GNC being associated with higher self-esteem. The LRT further strengthened this finding by showing that the inclusion of GNC measure type significantly improved model fit (see Table 9). In line with our approach for mental distress, we decided to include GNC measure type as moderator for the following analyses whenever possible.

Table 8. *Overview of Results for Moderator Analysis for Self-Esteem*

Moderator	k	e	Range	Mean	M(r)	β	LL	UL	F / t	df	p
			Estimates per Study				95% CI				
Cultural factors											
Socioeconomic indices											
GDP per Capita	16	31	1-4	1.94	-	-	-	-	12.12	(3, 12)	<.001
GDP per Capita	16	31	-	-	-	−0.0003	−0.01	0.01	−0.06	12	.955
GNC-type	16	31	-	-	-	−1.12	−2.19	−0.04	−2.27	12	.043
GDP per Capita x GNC-type	16	31	-	-	-	0.01	−0.01	0.03	1.47	12	.167
Human Capital Index	16	31	1-4	1.94	-	-	-	-	9.54	(3, 12)	.002
Human Capital Index	16	31	-	-	-	0.05	−2.44	2.53	0.04	12	.967
GNC-type	16	31	-	-	-	1.27	−1.74	4.28	0.92	12	.376
Human Capital Index x GNC-type	16	31	-	-	-	−2.24	−6.28	1.81	−1.20	12	.252
Gender equality											
Gender Gap Index (GGI)	16	31	1-4	1.94	-	-	-	-	8.39	(3, 12)	.003
GGI	16	31	-	-	-	3.21	−2.47	8.88	1.23	12	.242
GNC-type	16	31	-	-	-	3.06	−6.33	12.45	0.71	12	.491
GGI x GNC-type	16	31	-	-	-	−4.42	−16.58	7.74	−0.79	12	.444
Social Institute and Gender Index (SIGI)	16	31	1-4	1.94	-	-	-	-	83.89	(3, 12)	<.001
SIGI	16	31	-	-	-	−0.02	−0.02	0.02	−0.15	12	.020
GNC-type	16	31	-	-	-	−1.30	−1.85	−0.76	−5.19	12	<.001
SIGI x GNC-type	16	31	-	-	-	0.05	0.01	0.09	2.97	12	.012
Homophobia											
Homophobic Climate Index	16	31	1-4	1.94	-	-	-	-	15.48	(3, 12)	<.001
Homophobic Climate Index	16	31	-	-	-	0.15	−0.73	1.03	0.37	12	.721
GNC-type	16	31	-	-	-	−0.37	−0.94	0.19	−1.45	12	.174
Homophobic Climate Index x GNC-type	16	31	-	-	-	0.02	−2.01	2.05	0.02	12	.983
Hofstede's cultural dimensions											
Individualism	16	31	1-4	1.94	-	-	-	-	140.39	(3, 12)	<.001
Individualism	16	31	-	-	-	-0.01	0.19	1.30	-2.19	12	.049
GNC-type	16	31	-	-	-	-1.86	-0.02	0.00003	-5.28	12	<.001
Individualism x GNC-type	16	31	-	-	-	0.02	0.01	0.03	3.69	12	.003

Moderator	k	e	Estimates per Study Range	Estimates per Study Mean	M(r)	β	95% CI LL	95% CI UL	F / t	df	p
Masculinity	16	31	1-4	1.94	-	-	-	-	10.36	(3, 12)	<.001
Masculinity	16	31	-	-	-	0.001	−0.004	0.003	−0.38	12	.710
GNC-type	16	31	-	-	-	−0.08	−1.64	1.48	−0.11	12	.917
Masculinity x GNC-type	16	31	-	-	-	0.005	−0.03	0.02	−0.37	12	.721
Uncertainty avoidance	16	31	1-4	1.94	-	-	-	-	79.87	(3, 12)	<.001
Uncertainty avoidance	16	31	-	-	-	0.01	0.01	0.01	6.40	12	<.001
GNC-type	16	31	-	-	-	0.79	0.24	1.35	3.10	12	.009
Uncertainty avoidance x GNC-type	16	31	-	-	-	−0.02	−0.03	−0.01	−5.36	12	<.001
Indulgence	16	31	1-4	1.94	-	-	-	-	217.36	(3, 12)	<.001
Indulgence	16	31	-	-	-	−0.01	−0.01	−0.002	−3.71	12	.003
GNC-type	16	31	-	-	-	−1.24	−1.55	−0.93	−8.78	12	<.001
Indulgence x GNC-type	16	31	-	-	-	0.01	0.01	0.02	4.43	12	<.001
Power distance	16	31	1-4	1.94	-	-	-	-	25.73	(3, 12)	<.001
Power distance	16	31	-	-	-	−0.01	−0.01	0.05	−0.19	12	.856
GNC-type	16	31	-	-	-	−2.97	−5.54	−0.39	−2.51	12	.028
Power distance x GNC-type	16	31	-	-	-	0.07	−0.001	0.14	2.14	12	.054
Long-term orientation	16	31	1-4	1.94	-	-	-	-	55.20	(3, 12)	<.001
Long-term orientation	16	31	-	-	-	0.002	−0.002	0.01	1.07	12	.308
GNC-type	16	31	-	-	-	−0.12	−0.46	0.23	−0.73	12	.480
Long-term orientation x GNC-type	16	31	-	-	-	−0.01	−0.01	−0.001	−2.54	12	.026
Individual factors											
Gender (Percentage of men)	16	31	1-4	1.94	-	-	-	-	10.03	(3, 12)	<.001
Gender	16	31	-	-	-	0.001	−0.0003	0.002	1.66	12	.124
GNC-type	16	31	-	-	-	−0.35	−0.52	−0.18	−4.46	12	<.001
Gender x GNC-type	16	31	-	-	-	−0.0002	−0.002	0.002	−0.24	12	.818
Sexual orientation	6	13	1-4	2.17	-	-	-	-	9.03	(3, 2)	.101
Sexual orientation	6	13	-	-	-	0.001	−0.01	0.01	0.52	2	.656
GNC-type	6	13	-	-	-	−0.26	−0.70	0.18	−2.53	2	.128
Sexual orientation x GNC-type	6	13	-	-	-	−0.001	0.77	0.01	−0.34	2	.766

	k	e		M(r)		ß	LL	UL	F / t	df	p
Participants' age	13	25	1-4	1.92	-	-	-	-	6.80	(3, 9)	<.001
Participants' age	13	25	-	-	-	0.003	−0.01	0.01	0.76	9	.013
GNC-type	13	25	-	-	-	−0.15	−0.51	0.21	−0.96	9	.209
Participants' age x GNC-type	13	25	-	-	-	−0.01	−0.02	0.01	−0.89	9	.010

<div align="center">Methodological factors</div>

	k	e		M(r)		ß	LL	UL	F / t	df	p
Study-related factors											
Publication year	15	27	1-4	1.80	-	-	-	-	7.10	(3, 11)	.006
Publication year	15	27	-	-	-	−0.01	−0.02	0.002	−1.72	11	.744
GNC-type	15	27	-	-	-	−17.40	−46.68	11.87	−1.31	11	.633
Publication year x GNC-type	15	27	-	-	-	0.01	−0.01	0.02	1.28	11	.614

Note. This table summarizes the results of the moderator analysis for self-esteem. The results of the omnibus moderator tests are reported in the line of the respective moderator, with main and interaction effects provided in the corresponding rows below. Moderator tests that were not reported in the table could not be performed due to an insufficient number of studies (for an overview see SM-6). *GNC* = gender nonconformity; *k* = number of studies; *e* = number of effects; *M(r)* = meta-analytically estimated effect; ß = regression coefficient; *95% CI* = 95% confidence interval; UL = upper limit; LL = lower limit; *F / t* = test statistic for regression coefficient or effect estimate; *df* = degrees of freedom of the test statistic; *p* = significance level.

Table 9. *Comparison of Meta-Analytic Models on Self-esteem With and Without 'GNC Measure Type'*

Model	*df*	AIC	BIC	logLik	LRT	*p*
Model with GNC measure type	4	–9.11	–0.54	8.55		
Model without GNC measure type	3	107.08	111.42	–51.54	120.19	< .001

Note. This table shows the results of the likelihood-ratio-test to check the influence of the moderator GNC measure type on the model fit. Lower values of the model fit indices Akaike information criterion (AIC) and Bayesian information criterion (BIC) indicate a better model fit. *df* = degrees of freedom; logLik = log-likelihood; LRT = result of the likelihood ratio test, *p* = significance level.

Cultural Moderators

Gender (In)Equality. We found a significant interaction between the SIGI and GNC measure type, β = 0.05, 95% CI [0.01, 0.09], *t*(12) = 2.97, *p* = .012. For personality-based GNC measures, correlations decreased in size with greater gender equality, while this decrease was not present for behavioral-based GNC measures (see Figure 12).

Figure 12. *The Moderation Effect of the Social Institutions and Gender Index (SIGI) on the Relationship between GNC and Self-Esteem*
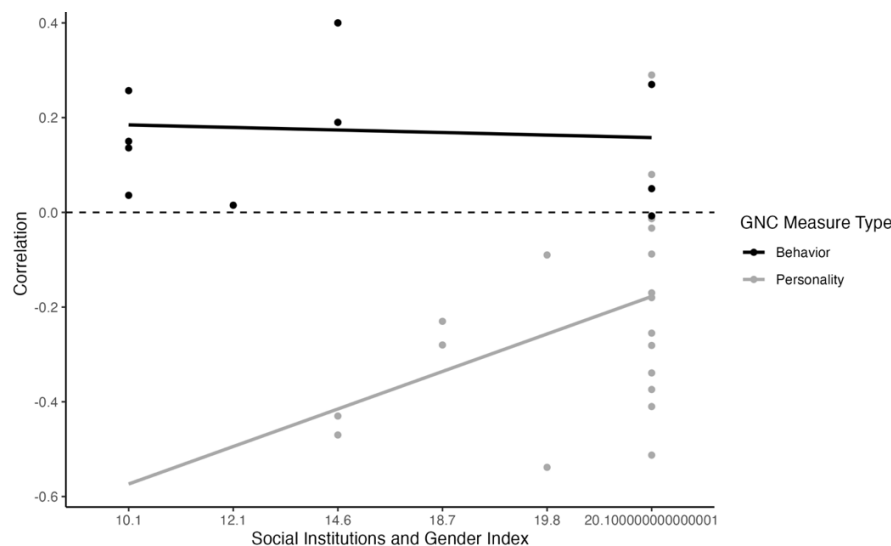
Note. This figure shows the influence of the Social Institutions and Gender Index (SIGI) on the relationship between gender nonconformity (GNC) and self-esteem for behavior-based (black) and personality-based (grey) GNC measures. The dots reflect the correlations of the individual samples, and the lines are the respective regression lines. The correlations are coded in such a way that higher values indicate a greater association between higher levels of GNC and poorer mental health.

Cultural Dimensions.

There was a significant interaction effect between GNC measure type and **individualism**, β = 0.02, 95% CI [0.01, 0.03], $t(12)$ = 3.69, p = .003 (see Figure 13 for a visualization). For both types of GNC measures, effect estimates decreased with increasing individualism scores—that is, the link between GNC and self-esteem was smaller (i.e., trended to zero) for more individualistic cultures. For behavior-based measures, the association of higher GNC and lower self-esteem became smaller; for personality-based measures, the relationship between the link between higher GNC and higher self-esteem decreased.
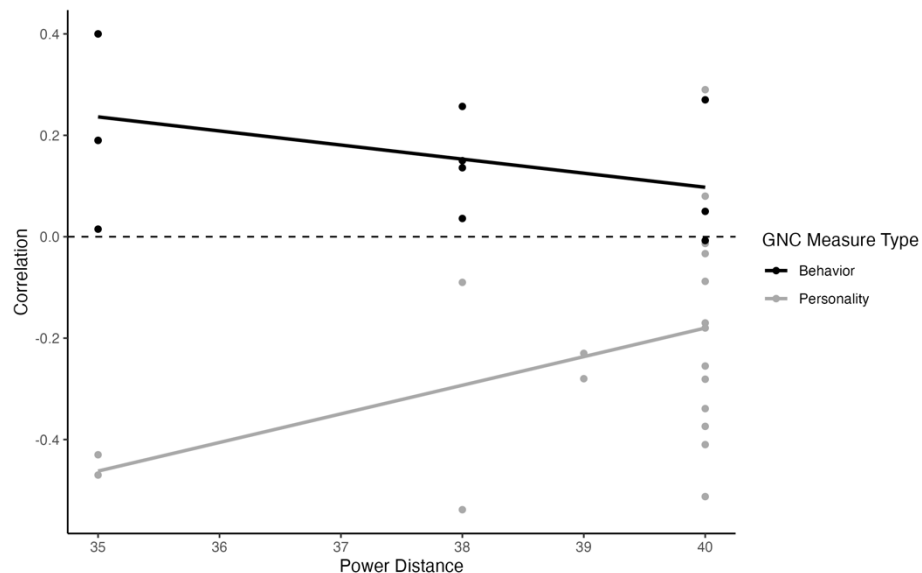
Figure 13. *The Moderation Effect of Individualism on the Relationship between GNC and Self-Esteem*
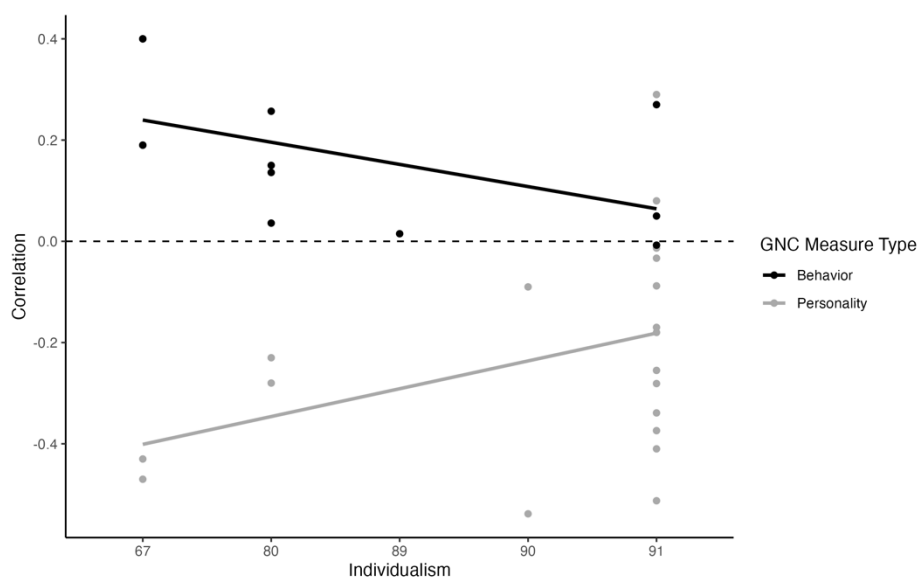
Note. This figure shows the influence of the cultural dimension individualism on the relationship between gender nonconformity (GNC) and self-esteem for behavior-based (black) and personality-based (grey) GNC measures. The dots reflect the correlations of the individual samples, and the lines are the respective regression lines. The correlations are coded in such a way that higher values indicate a greater association between higher levels of GNC and poorer mental health.

There was also a significant reaction of **uncertainty avoidance** with GNC measure type, $\beta =$ −0.02, 95% CI [−0.03, −0.01], $t(12) = -5.36$, $p < .001$. For higher levels of uncertainty avoidance, we found stronger associations (i.e., higher absolute values) for both GNC measure types. For behavior-based measures, the link between higher GNC and lower self-esteem became stronger, while for personality-based measures the association between higher GNC and better self-esteem increased (see Figure 14).

Figure 14. *The Moderation Effect of Uncertainty Avoidance on the Relationship between GNC and Self-Esteem*

Note. This figure shows the influence of the cultural dimension uncertainty avoidance on the relationship between gender nonconformity (GNC) and self-esteem for behavior-based (black) and personality-based (grey) GNC measures. The dots reflect the correlations of the individual samples, and the lines are the respective regression lines. The correlations are coded in such a way that higher values indicate a greater association between higher levels of GNC and poorer mental health.

For **power distance**, there was a close-to-significant interaction with GNC measure type, β = −0.07, 95% CI [−0.001, 0.14], *t*(12) = 2.14, *p* = .054. For personality-based GNC measures, there was a trend toward numerically smaller effect estimates for cultures with larger power distance, while effect estimates for behavior-based measures showed a smaller association with power distance (see Figure 15).
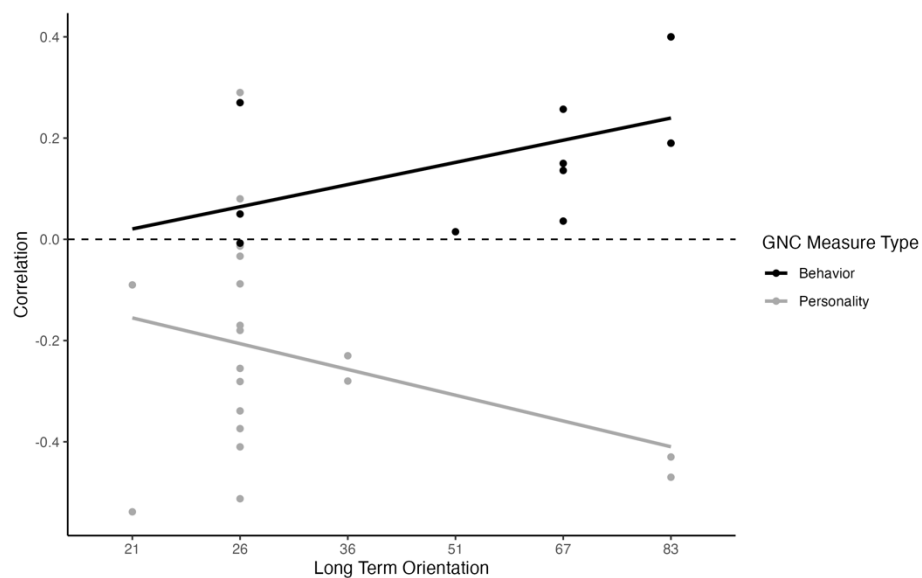
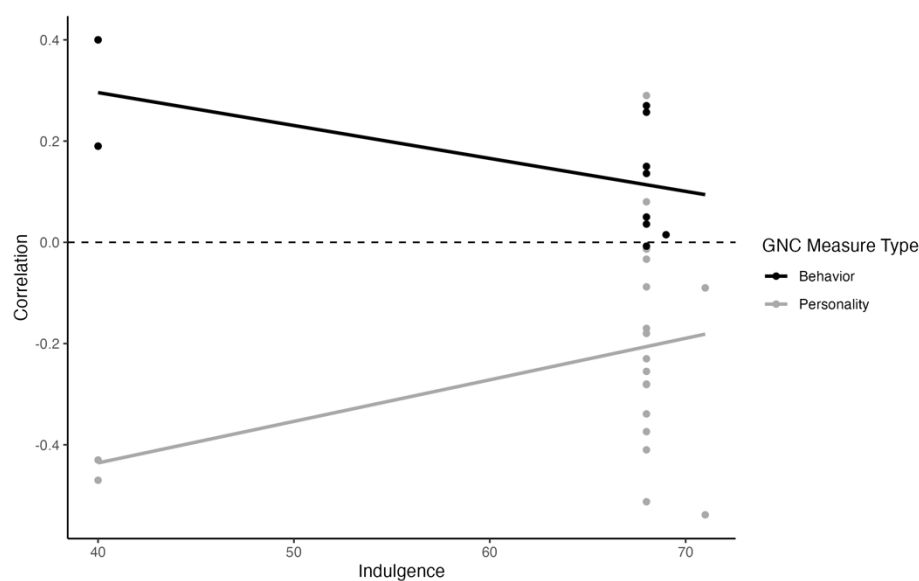**Figure 15.** *The Moderation Effect of Power Distance on the Relationship between GNC and Self-Esteem*

Note. This figure shows the influence of the cultural dimension power distance on the relationship between gender nonconformity (GNC) and self-esteem for behavior-based (black) and personality-based (grey) GNC measures. The dots reflect the correlations of the individual samples, and the lines are the respective regression lines. The correlations are coded in such a way that higher values indicate a greater association between higher levels of GNC and poorer mental health.

For **long-term orientation**, we found a significant interaction with GNC measure type, β = −0.01, 95% [−0.01, −0.001], $t(12)$ = −2.54, p = .026. For both measure types, associations with self-esteem became stronger with increasing long-term orientation. For behavior-based measures, the links with lower self-esteem were stronger when long-term orientation was larger; for personality-based measures, higher levels of long-term orientation were associated with a stronger link of GNC and higher self-esteem (see Figure 16).

Figure 16. *The Moderation Effect of Long Term Orientation on the Relationship between GNC and Self-Esteem*

Note. This figure shows the influence of the cultural dimension long term orientation on the relationship between gender nonconformity (GNC) and self-esteem for behavior-based (black) and personality-based (grey) GNC measures. The dots reflect the correlations of the individual samples, and the lines are the respective regression lines. The correlations are coded in such a way that higher values indicate a greater association between higher levels of GNC and poorer mental health.

Indulgence showed a significant interaction with GNC measure type, β = 0.01, 95% CI [0.01,

0.02], *t*(12) = 4.43, *p* < .001. Absolute values decreased with higher levels of indulgence for both

types of measures. For behavior-based measures, lower levels of indulgence were associated with a

stronger link between GNC and lower self-esteem. For personality-based measures, there was no

association with cultural indulgence (see Figure 17).

Figure 17. *The Moderation Effect of Indulgence on the Relationship between GNC and Self-Esteem*

Note. This figure shows the influence of the cultural dimension indulgence on the relationship between gender

nonconformity (GNC) and self-esteem for behavior-based (black) and personality-based (grey) GNC measures. The dots

reflect the correlations of the individual samples, and the lines are the respective regression lines. The correlations are

coded in such a way that higher values indicate a greater association between higher levels of GNC and poorer mental

health.

Further moderator analyses did not reveal any significant moderator (see Table 7), while

other analyses could not be performed due to missing primary studies (see SM-6 for details).

Individual Moderators. We found no evidence for moderator effects of mean sample age,

sexual orientation, gender, and other individual moderators.

Methodological Moderators. The only moderator that could be examined was publication

year, which was not significantly associated with effect estimates.

Publication Bias

An overview of analyses on publication bias for mental distress can be found in Table 10 and in Table 11 for the single outcome level, while results for single approaches can be found in the Supplementary Material (see SM-10).

Mental Distress. For the 3-level meta-analysis, we found no evidence of publication bias.

Anxiety Symptoms. One of the seven tests provided evidence for publication bias. In the bias-corrected 3PSM, the intercept was only close to significant, $M(r)_{adjusted}$ = .09, 95% CI [−.01, .19], p = .070. However, the selection model did not perform significantly better than the unadjusted model, $\chi^2(1)$ = 0.03, p = .863, so there is no evidence that publication bias had a substantial impact.

Depressive Symptoms. There was evidence in favor of publication bias in three out of seven tests. The trim-and-fill analysis indicated that eight studies were missing on the left side, with a nonsignificant effect estimate in the adjusted model, $M(r)$ = .05, 95% CI [−.01, .11], z = 1.73, p = .083. Similarly, the 3PSM model suggested the impact of publication bias with a nonsignificant adjusted model, $M(r)_{adjusted}$ = .02, 95% CI [−.07, .11], p = .652, showing better model than the unadjusted model, $\chi^2(1)$ = 5.45, p = .020. Thus, the results for depressive symptoms were likely affected by publication bias.

Externalizing Symptoms. Four out of six tests provided evidence for a relevant impact of publication bias. Both regression tests indicated funnel plot asymmetry, b = 0.11, 95% CI [0.04, 0.17], z = -2.06, p = .004; Kendall's Tau = −0.87, p = .018. The trim-and-fill analysis suggested three missing studies on the right side, but the adjusted model also suggested a significant association between GNC and externalizing symptoms, $M(r)_{adjusted}$ = .06, 95% CI [.03, .09], z = 3.57, p < .001. The PET-PEESE analysis indicated a relevant impact of publication bias, $M(r)_{PET}$ = .10, 95% CI [.04, .17], z = 3.34, p = .001, and a smaller correlation in the corrected model, $M(r)_{PEESE}$ = .07, 95% CI [.03, .11], z = 3.63, p < .001. Thus, publication bias might have resulted in inflated effect estimates for externalizing symptoms.

Table 10. *Results of Publication Bias Approaches for the 3-Level Meta-Analysis of Mental Distress*

Approach	Coefficient/ Test	Estimate	95% Confidence Interval LL	95% Confidence Interval UL	z	p
3-Level Funnel Plot Test	Intercept	0.10	0.06	0.14	5.22	<.001
	Mods	−0.00001	−0.00003	0.00001	-1.17	.241
Egger's Regression Test	Intercept	0.11	0.07	0.15	5.50	<.001
	Mods	−3.27	−6.81	0.26	-1.81	.070
Begg and Mazumdar Rank Correlation	Intercept	0.11	0.07	0.15	5.50	<.001
Test (Approximation)	Mean_vi	−3.27	−6.81	0.26	-1.81	.070

Approach			Kendall's Tau	z	p
Begg and Mazzumdar Rank Correlation Test as proposed by Fernández-Castilla et al. (2019)			−0.01	−0.31	.753

Approach	Added Studies Left Side	Added Studies Right Side
Duval & Tweedie Trim and Fill Method as proposed by Fernández-Castilla et al. (2019)	0	0

Note. This table summarizes the results of the publication bias analyses for the three-level meta-analysis on mental distress. LL = Lower Limit; UL = Upper Limit, *z* = z statistic, *p* = significance level; PET = precision-effect test; PEESE = precision-effect estimate with standard errors.

Table 11. *Overview of Evidence of Publication Bias for Different Approaches*

Outcome	Egger's Regression Test	Rank Test	Trim and Fill	PET-PEESE	3-Parameter-Selection-Model
Anxiety	NO	NO	NO	NO	YES
Depressive Symptoms	NO	NO	YES (L:8)	NO	YES*
Externalizing Symptoms	YES	YES	YES (R:3)	YES	NA
General Psychological Distress	NO	NO	YES (R:5)	YES	YES
Internalizing Symptoms	NO	NO	YES (R:1)	NO	NA
Post-Traumatic Stress Symptoms	NO	NO	NO	NO	NO
Social Anxiety Symptoms	NO	NO	NO	YES	YES
Substance Use	NO	NO	NO	NO	NA
Suicidality	NO	NO	YES (L:4)	NO	NO
Self-esteem	NO	NO	NO	NO	NO
Well-being	NO	NO	YES (L:2)	NO	YES*
Body Image Problems	NO	NO	YES (R:1)	NO	NA
Rumination	NO	NO	YES (R:2)	NO	NA

Note. This table summarizes the results of the publication bias analysis for single symptoms. PET-PEESE = precision-effect test and precision-effect estimate with standard errors; YES = indicates a significant impact of publication bias; YES* = indicates significant impact of publication bias with significant likelihood ratio test for the 3-paramter selection model; NO = indicates no significant impact of publication bias; (L:) = number of studies added on the left side; (R:) = number of studies added on the right side; NA = test could not be calculated.

Psychological Distress. Three out of seven tests provided evidence for a relevant impact of publication bias. The trim-and-fill analysis added five missing studies, which resulted in a larger corrected effect estimate, $M(r)$ = .14, 95% CI [.07, .21], z = 3.99, p < .001. Similarly, the PET-PEESE analysis suggested the presence of publication bias, $M(r)_{PET}$ = .15, 95% CI [.05, .25], z = 2.91, p = .004, with the correction resulting in a slightly smaller, yet still significant correlation, $M(r)_{PET}$ = .12, 95% CI [.05, .19], z = 3.36, p = .001. The 3PSM provided evidence for publication bias with a nonsignificant intercept, $M(r)$ = .09, 95% CI [.00, .18], z = 1.94, p = .053, but model fit was not improved for the corrected model, $\chi^2(1)$ = 0.01, p = .914. Thus, there was some evidence of publication bias, but the corrected models provided similar results to those produced in the main analysis.

Internalizing Symptoms. One out of six tests provided evidence for publication bias. Only the trim-and-fill analysis indicated one missing study on the right side, with the corrected estimate still showing a significant association, $M(r)$ = .03, 95% CI [.00, .21], z = 2.18, p = .029. Overall, this suggests a small impact of publication bias for internalizing symptoms.

Post-traumatic Stress Symptoms. None of the tests suggested publication bias had an impact.

Social Anxiety Symptoms. Two out of seven tests provided evidence for publication bias. The PET-PEESE analysis suggested the presence of publication bias, $M(r)_{PET}$ = .25, 95% CI [.10, .39], z = 3.34, p = .001, and a smaller, yet still significant effect estimate when adjusting for this bias, $M(r)_{PEESE}$ = .18, 95% CI [.08, .28], z = 3.63, p < .001. The 3PSM also found evidence for a publication bias, $M(r)$ = .05, 95% CI [−.15, .25], z = 0.53, p = .599; however, model fit was not improved for the selection model, $\chi^2(1)$ = 2.21, p = .137. These results provide evidence for a relevant impact of publication bias, with corrected models yielding smaller estimates.

Substance Use. None of the tests provided evidence of publication bias.

Suicidality. One out of seven tests suggested the presence of publication bias, with the trim-and-fill analysis adding four missing studies on the left side. The adjusted model no longer supported

a significant association, *M(r)* = .02, 95% CI [−.04, .08], *z* = 0.56, *p* = .575. These results suggest that there is no strong evidence for publication bias.

Body Image Problems. One out of six tests provided evidence for the presence of publication bias. The trim and fill analysis added one missing study on the right side, with the adjusted model not changing the conclusions of the main analysis, *M(r)* = −.07, 95% CI [−.19, .04], *z* = −1.25, *p* = .210. Taken together, these findings do not suggest publication bias had a strong impact.

Rumination. One out of six tests provided evidence for publication bias. The trim-and-fill analysis indicated two missing studies on the right side, with an adjusted correlation of *M(r)* = .10, 95% CI [.05, .16], *z* = 3.64, *p* < .001, which was larger than the association found in the main analysis. Taken together, these findings suggest no relevant impact of publication bias.

Self-esteem. There was no evidence for publication bias had an impact for self-esteem.

Well-being. Three out of six tests provided evidence for publication bias. The trim-and-fill analysis added two missing studies on the left side, with an adjusted correlation of *M(r)* = .07, 95% CI [−.06, .20], *z* = 1.11, *p* = .266. The 3PSM also found evidence for publication bias, *M(r)* = −.11, 95% CI [−.39, .17], *z* = −0.78, *p* = .434, with the selection model showing improved model fit, $\chi^2(1)$ = 6.18, *p* = .013. Taken together, these findings suggest a potential impact of publication bias; however, the corrected models did not suggest alternate conclusions.

Publication Status. There was no significant difference between published studies and unpublished data for mental distress, $Q_M(1,79)$ = 2.03, *p* = .158, or for self-esteem, $Q_M(1,25)$ = 0.12, *p* = .730.

Sensitivity Analyses

Risk-of-bias. We re-estimated our primary analyses, excluding effect estimates at risk of bias (i.e., unclear or high risk; see SM-10.3). We found that effect estimates changed slightly for mental distress, .07 ≤ *M(r)* ≤ .12, but only for the domain of participation rates did the effect estimate become nonsignificant, *M(r)* = .07, 95% CI[−.02, .16], 95% PI [−.30, .44], *p* = .130. For self-esteem, the effect estimates remained mostly comparable in size, .07 ≤ *M(r)* ≤ .11. Only for the domain reliability

and validity of measures the effect estimates became significant, *M(r)* = .11, 95% CI [.004, .22], 95% PI [−.42, .64], *p* = .043. For participation rates, however, the effect estimates increased, *M(r)* = .26, 95% CI [−.002, .53], *p* = .020. For well-being and rumination, the results remained largely unchanged.

Between-outcomes Correlations. To examine the robustness of our findings with respect to between-outcome correlations, we recalculated our main analyses for mental distress with weaker (ρ = 0.25) and stronger (ρ = 0.65) between-outcome correlations. Our results remained unchanged for alternative between-outcome correlations.

Parametric versus Nonparametric Correlations. Due to the limited number of studies using nonparametric correlations, we were only able to conduct this sensitivity analyses for behavior-based GNC measures. We found no differences regarding the correlation type (parametric vs. nonparametric correlations), $Q_M(1,32) = 0.11$, $p = .742$. Analyses on self-esteem, well-being, body image problems, and rumination solely included Pearson correlations.

Cross-sectional versus Longitudinal Associations. Because there were not enough studies available for a conjoint analysis, we conducted the sensitivity analysis exclusively for behavior-based GNC measures. No significant difference emerged between longitudinal and cross-sectional associations, $Q_M(1,32) = 0.02$, $p = .894$. For other outcome types, the small number of longitudinal associations did not allow for comparison.

Small-Sample Adjustment. The results remained unchanged when bias-reduced linearizations were used for small-sample adjustment in our main analyses (see SM-9), suggesting no impact of the number of clusters included in our analyses.

3.5   Discussion

This is the first systematic review and meta-analysis summarizing the current state of research on the relationship between GNC as a continuous measure and mental health including measures of mental distress and positive mental health. As effect estimates for this association were highly heterogeneous among primary studies, we examined a large range of potential cultural, individual, and methodological moderators to account for these between-study differences.

We identified a total of 106 eligible studies comprising 489 effect estimates. Our main analysis suggested a small yet significant association between GNC and mental distress, with higher levels of GNC being associated with greater mental distress (see Table 3). At first glance, our research synthesis thus supports the findings of many primary studies that found GNC to be associated with poorer mental health (e.g., Alanko et al., 2008; Oginni et al., 2019; van Beusekom et al., 2018). However, considerable heterogeneity between the primary studies and the wide prediction intervals pointed to a more complex picture. In the case of mental distress, at the single-symptom level, correlations ranged between .04 ≤ $M(r)$ ≤ .21, with the largest correlations being found for symptoms of post-traumatic stress and substance use. In the case of externalizing symptoms, however, we did not find a significant association with GNC. For self-esteem, well-being, body image problems, and rumination, there was no evidence for a significant association in our analysis, although these effect estimates were considerable heterogenous, ranging from negligible to moderate relationships among primary studies.

This heterogeneity was further examined through moderator analyses for mental distress and self-esteem, while such analyses were not possible for other outcome types due to the small number of effect estimates. First, we examined the moderator effect of GNC measurement type and compared instruments mainly assessing "visible" behavioral-based GNC (e.g., the Recalled Childhood Gender Role/Gender Identity Questionnaires; Zucker et al., 2006) with those employing a personality-based approach to GNC (e.g., BSRI; Bem, 1974), which mainly focus on "invisible" components of the self-concept. Behavior-based GNC measures were associated with worse mental health, while personality-based measures were linked to better mental health, although this effect was only close-to-significant for mental distress. Given the major importance of GNC measure type in our analyses, we decided *post hoc* to include this variable as an additional moderator in further moderator analyses whenever possible.

In line with previous research (e.g., Berke et al., 2022; Lehavot, King, & Simoni, 2011; Zentner & von Aufsess, 2022), our analyses provided preliminary evidence for the impact of cultural factors

on the link between GNC and mental health. Our analyses suggested the influence of gender equality

as well as the cultural dimensions of individualism, uncertainty avoidance, indulgence, power

distance, and long-term orientation. In general, there was only scant evidence for other moderator

effects. For behavior-based measures, GNC was more strongly linked to higher mental distress when

larger proportions of African American and Black individuals were included in primary studies.

In summary, the relationship between GNC and mental health is complex. On average,

associations were small, but substantially varied depending on the type of GNC measure used

(behavior- vs. personality-based) and cultural factors. The moderators identified in our meta-analyses

may help to explain the, at first sight, contradictory findings of primary studies and point to a strong

need for conceptual clarification.

3.5.1   *Gender Nonconformity: A Heterogenous and Complex Concept?*

Our moderator analyses suggested that the observed between-study differences may to

some extend derive from the different operationalizations of GNC reflected in different types of GNC

measures. Behavior-based GNC measures focus on visible aspects of gender expression such as

appearance, interests, and perceivable behavior (e.g., Freund et al., 1977; Golombok et al., 2008;

Golombok & Rust, 1993; Hockenberry & Billingham, 1987; Zucker et al., 2006), while personality-

based GNC measures assess personality traits associated with traditional gender roles, such as

warmth and affectionate behavior for femininity or ambitiousness and dominance for masculinity

(e.g., Bem, 1974; Hall & Halberstadt, 1980; Helmreich et al., 1981). Some personality-based GNC

measures such as the BSRI have been criticized for their abstract wording and narrow focus, which

can lead to different interpretations and may neglect important aspects such as behavior and

appearance (Lehavot, King, & Simoni, 2011). The missing information on behavior and appearance in

personality-based GNC measures might result in the divergent findings, given the hypothesis that the

way others perceive and respond to gender-nonconforming behavior (e. g., with stigmatization and

victimization) could account (at least partly) for the link between GNC and mental health (Green et

al., 2018; Wylie et al., 2010).

In line with this thinking, it seems to be important for the link between GNC and mental health that GNC is reflected in perceivable behavior such as sex-typed behaviors, interests, appearance, and interpersonal styles, which represent an external cue for social categorization processes (Rieger et al., 2008). Personality-based GNC measures, however, might not always relate to (potentially perceivable) behavior (Monson et al., 1982; Reynolds et al., 2006; Wylie et al., 2010), which is also reflected in the small associations between personality- and behavior-based measures (e.g., Henrichs-Beck & Szymanski, 2017). In turn, those scoring high on personality-based GNC measures may experience no to low social stigmatization, while this is less likely for those scoring high on behavior-based GNC measures. In line with this notion, the meta-analysis by Hu et al. (2023) found differences between GNC measure types for the association of GNC and victimization experiences at the trend level, with numerically smaller correlations for personality-based GNC measures, $M(r)$ = .10, 95% CI [.04, .15] than for behavior-based GNC measures, $M(r)$ = .15, 95% CI [.12, .18]. Moreover, stereotypically masculine personality traits appear to be perceived more positively than feminine traits (Leaper, 1994). This assumption is supported by findings that show moderate correlations between higher levels of masculinity and fewer depressive symptoms, irrespective of participants' gender, while the correlation for femininity with fewer depressive symptoms is weaker and only found in women (J. Lin et al., 2021). Masculinity may also be a potential protective factor for mental health problems (J. Lin et al., 2021), which might be due to lower levels of social stigmatization and the positive evaluation of masculine personality traits (Leaper, 1994). However, it is also worth looking at the single-item level of personality-based GNC measures, as the "protective" effect of masculinity might be also result from item selection. For example, in the PAQ, masculinity is operationalized as "stand up well," "never give up," "active," and "decisive" (J. Lin et al., 2021; Helmreich et al, 1981), which may also represent indicators of "non-depressive" behavior (APA, 2013). Overall, our findings are in line with Lin et al. (2021) and may suggest a potentially "protective" effect of personality-based GNC, although the effect is likely small and driving factors need to be explored.

However, behavior-based GNC measures are at risk for such "conceptual confounding." Some of the included GNC measures explicitly assess stigmatization experiences: "As a child, I had the reputation of a 'sissy'/'tomboy'" (Recalled Childhood Gender Role/Gender Identity Questionnaire; Zucker et al., 2006) and "As a child, I was considered a 'sissy' by the other boys" (Boyhood Gender Conformity Scale; Hockenberry & Billingham, 1987). These items might result in an overestimation of the relationship between behavior-based GNC and mental health, as they assess exposure GNC-related stressors rather than GNC per se (Strauss et al., 2024).

The temporal and cultural invariance of individual GNC measures might also be challenged. In the past, some measures also included aspects of sexual identity when measuring GNC (e.g., Freund et al., 1974; Freund et al.; 1977), which no longer corresponds to the concept of GNC. Gender roles may also change over time, and instruments should be checked repeatedly for their construct validity (Holt & Ellis, 1998). The measurement invariance across cultures should also be established, as gender roles may vary between cultures (Lehavot, King, & Simoni, 2011), which is also reflected in problems with the replication of the BSRI's (Bem, 1974) factor structure for the femininity and masculinity scales (Zhang et al., 2001). Our findings on the impact of cultural dimensions on the link between GNC and mental health underscore the potential importance of culture in this field. There is thus an urgent need for an in-depth analysis of these cultural differences, starting with analyses of measurement (in)variance for instruments assessing GNC.

Taken together, behavior- and personality-based measures may assess different constructs or at least different aspects of GNC, but this points to a key problem in the field—that is, the inconsistent definitions of GNC. GNC is a multifaceted and complex construct that is reflected in various aspects of experience and behavior (APA, 2015). The nomenclature of GNC is similarly complex, which may also indicate possible differences in underlying constructs and operationalization. Even when studies employ the same GNC measures, concrete operationalizations differ. For example, Zentner and von Aufsess (2022) used the BSRI (Bem, 1974) to measure GNC, assuming that greater GNC would be indicated by lower scores on the assigned gender scale of the

BSRI (e.g., low masculinity in men). Plöderl and Fartacek (2005) also used the BSRI but employed a form of dummy coding by assigning individuals to the GNC group if they scored above the median on the other-gender scale and at the same time, below the median on the assigned gender scale. In contrast, Bem (1974) recommended the "androgyny score" to assess one's gender role—that is, a difference score of the masculinity and femininity scale. The latter definition was also chosen for Hu et al.'s (2023) systematic review. However, since we found only few difference scores in primary studies, we decided to use the operationalization that came closest to the definition of GNC used in this systematic review—that is, a high expression on the other-gender scale compared to the assigned gender (e.g., high femininity in men or high masculinity in women; e.g., Lowry et al., 2018; Thoma et al., 2021). These inconsistencies might also reflect temporal changes in the understanding of GNC. For example, it was previously presumed that masculinity and femininity constituted a unidimensional continuum (Bem, 1974), whereas contemporary research views them as distinct and independent dimensions (J. Lin et al., 2021).

This inconsistent operationalization also complicates the synthesis of findings across primary studies. To date, there is still a lack of primary studies comparing and contrasting a broad range of operationalizations and examining their interrelations. However, such studies are needed to develop a coherent theoretical framework for GNC. Liben and Bigler (2008) suggested that GNC should be divided into three domains: behavioral, cognitive, and affective. The behavioral domain refers to the extent to which a person behaves according to the cultural behavioral gender norm. This domain involves both *what* and *how* behaviors are displayed and is thus the most "visible" trait. The cognitive domain refers to the extent to which individual beliefs and attitudes about gender differ from those of other people in the same culture. The affective domain refers to the extent to which feelings about their own and others' gender differ from the cultural norm, including gender identity and gender dysphoria.

Another interesting approach to GNC as a multicomponent was developed by Lehavot, King, and Simoni (2011), who differentiated between three aspects of gender expression in sexual minority

women: gender roles, appearance, and emotional expression. In a subsequent study, they found that the subscales appearance and gender roles were differentially related to mental health outcomes (Lehavot & Simoni, 2011). Thus, GNC is likely to represent a multicomponent construct (Egan & Perry, 2001), with different components being differentially related to mental health.

3.5.2 Cultural Factors Associated with the Relationship between GNC and Mental Health

Our moderator analyses emphasized the influence of various cultural influences on the relationship between GNC and mental health.

3.5.2.1 Geographical and Socioeconomic Differences

Primary studies included in the evidence synthesis focused on Western high-income countries, with a significant number of studies being conducted in the USA (see Figure 2). We found no significant differences between studies from Europe and North America. Moreover, we found no significant impact based on socioeconomic indices—that is, country-level income, GDP per capita, and the Human Capital Index. This contrasts with previous findings that the number of expected years of schooling and the gross-national income moderated the association between femininity and depressive symptoms (J. Lin et al., 2021).

3.5.2.2 Gender (In)Equality

In line with Zentner and von Aufsess (2022), we found gender equality had an effect personality-based GNC measures. In their multinational study, they found the association between GNC and self-esteem to decrease at higher levels of gender equality. Similarly, our results indicated a decreasing correlation at higher levels of gender equality for personality-based GNC measures. In contrast to our findings, their analysis indicated weaker correlations for higher levels of gender equality, while we found more negative correlations for higher levels of gender equality (i.e., higher levels of GNC were associated with better mental health). These differences might result from the varying operationalization of GNC. What both have in common is that GNC is associated with either fewer mental health problems or better mental health in countries with higher gender equality, which might be due to a greater openness to gender role deviations (Zentner & von Aufsess, 2022).

However, this effect seems to be limited to the personality aspects of GNC, as we found no impact of gender equality on behavior-based GNC measures.

3.5.2.3   Homophobia

In contrast to our expectation, no moderator effect of country-level homophobia was found. This was surprising given the link between the stigmatization of GNC and homosexuality, as well as the association of homophobic climate, gender inequality, and human rights violations (Lamontagne et al., 2018). The absence of a moderator effect may result from variance restrictions and a small body of evidence from countries with high levels homophobia. Moreover, effects might also be nonlinear and include thresholds, with between-country differences being less relevant for the link between GNC and mental health when overall homophobia is low. Future studies assessing a larger range of homophobic climate scores are needed. At the same time, research on GNC in such countries can places unnecessary risk on researchers and participants.

3.5.2.4   Cultural Dimensions

Our moderator analyses suggested that five out of six cultural dimensions influence the relationship between GNC and mental health. Although the direction of the correlations for behavior- and personality-based GNC measures was opposite, a common pattern emerged in most analyses: The associations between GNC and mental health increased in magnitude for decreasing levels of individualism and indulgence and vice versa. A contrary pattern emerged for uncertainty avoidance and long-term orientation—that is, correlations decreased in magnitude for lower levels of uncertainty avoidance and long-term orientation and vice versa. For power distance, the findings were less consistent: Lower power distance was associated with an increasing magnitude for self-esteem, while this effect was limited to personality-based GNC measures for mental distress. For masculinity, we found no association with effect estimates, which is particularly surprising due to the proposed close association with gender roles (Hofstede et al., 2010).

These findings might be accounted for by the greater emphasis on individuality and equality in individualistic cultures and more flexible gender roles and looser sexual morality in indulgent

societies (Hofstede et al., 2010). In societies avoiding uncertainty, more rigid rules and norms are prevalent and deviations from those, such as GNC, are perceived as threatening. Cultural contexts may thus affect the perception of GNC and in turn the (negative) social reactions to GNC, which affect social stigmatization and discrepancy stress. Similar to Zentner and von Aufsess (2022), who suggested that the greater acceptance of deviations from traditional gender roles explains their findings on gender equality, our results suggest that the link between GNC and mental health is weaker in societies with higher levels of acceptance for individuality, a more equal treatment of individuals living in those societies, greater openness toward gender role deviations, and more flexible gender roles. Conversely, the association of GNC and mental health might increase when (gender) norms are stricter and openness to deviations from gender roles is lower.

At first sight, the findings on long-term orientation and power distance were counterintuitive. Based on the definition of long-term orientation, we would have expected more short-term oriented societies to be more traditional, which we thought would increase the magnitude of the correlations between GNC and mental health. We also expected stronger correlations for societies with larger power distance and thus greater acceptance for social differences. At the same time, in those societies differential treatment of individuals might be more common and more accepted.

In summary, our findings provide preliminary evidence for the assumption that cultural factors may affect the relationship between GNC and mental health. However, when evaluating our findings on cultural factors, they need to be interpreted in light of some limitations. First, given the research focus on Western high-income countries, variance restrictions may significantly affect our results; the robustness of those findings therefore needs to be tested in a future meta-analysis of yet to be conducted studies in more heterogenous cultural contexts. Second, the indicators examined in our analyses are measures at the country level, thus neglecting within-country differences (Signorini et al., 2009). For example, differences between urban and rural areas are conceivable (Huijsmans et al., 2021), and heterogeneity between individuals within one society is likely to be larger than

differences between societies (Signorini et al., 2009). Future studies should compare these between-
and within-country effects and examine their interplay. Moreover, also the validity and reliability of
Hofstede's cultural dimensions has been challenged (Gerlach & Eriksson, 2021; McSweeney, 2002;
Orr & Hauser, 2008), with the critique primarily focusing on the representativeness of the sample
used in Hofstede's original study (Baskerville, 2003; McSweeney, 2002), the statitic approach to
culture (McSweeney, 2002), the use of a relatively outdated database when establishing the model
(Fang, 2003), and its replicability (Gerlach & Eriksson, 2021). Third, we have used the most recent
indices, as indicators were not available for specific years and/or the year of data collection was not
reported, which may have introduced some bias by neglecting change over time. Despite those
limitations, our findings offer a starting point for future multinational studies examining the impact
of culture on the relationship between GNC and mental health.

3.5.3   *Individual Factors as Moderators of the Relationship between GNC and Mental Health*

3.5.3.1   Gender and Sexual Orientation

Gender and sexual orientation have been discussed as potential moderators of the
relationship between GNC and mental health. In our meta-analysis, we found no significant impact of
gender in the comparison of samples solely comprising men with those focusing on women samples
or when we examined the proportion of self-identified men in the sample as a continuous
moderator. Furthermore, we found no significant differences when the samples exclusively studied
gender minority individuals. Thus, our findings indicate comparable correlations regardless of gender.
This contradicts the earlier findings of primary studies. For gender minority samples in particular, we
expected higher correlations between GNC and mental health, as previous findings have suggested a
nonlinear "J-curve" relationship between GNC and mental health, with individuals presenting more
GNC experiencing disproportionately more stigmatization and mental health issues (Gordon et al.,
2018; Roberts et al., 2013). Which is also represented in the findings of Thoma et al. (2021), who
significant stronger association between GNC and victimization experiences, when samples included
gender minority participants. Based on the gender minority stress model (Testa et al., 2015), we

expected gender minorities to be exposed to additional minority stressors, thus resulting in heightened mental health problems. Moreover, we expected gender dysphoria to be present in some of those individuals and to further strengthen the association of GNC and mental health (e.g., Thompson et al., 2022). Ceiling effects may account for the missing moderator effect as the included gender minority samples were mostly recruited from clinical contexts such as specialized gender clinics. Due to this context, variance restrictions in both GNC and/or mental health might result in an underestimation of the link.

The proportion of heterosexual—and thus also the proportion of sexual minority—individuals included in the study sample had no moderator effect. This is in line with previous primary studies showing that individuals with higher levels of GNC experience more stigmatization regardless of their sexual orientation (e.g., Gordon et al., 2018; Ioerger et al., 2015). However, again, based on the minority stress model (Meyer, 2003), one may have expected a stronger link due to additional minority stressors in this group. Taken together, our analyses provide support for the idea that GNC is associated with mental health irrespective of participants' gender (identity) and sexual orientation.

3.5.3.2 Ethnic Identity

Our findings provide preliminary evidence for moderation by ethnic identity, with stronger associations appearing when larger proportions of African American and Black were included in primary studies. Additionally, we found a tendency for smaller correlations when the percentage of Caucasian and White participants was larger. This might be attributable to subcultural differences with respect to gender norms and roles (Lehavot, King, & Simoni, 2011; Moore, 2006). Furthermore, African American and Black individuals face additional stressors such as stigmatization and discrimination related to their ethnic identity, which can further increase psychological strain (Ghavami et al., 2020). The concept of intersectionality assumes that people who belong to several minority groups are also exposed to multiple forms of discrimination, which increases their risk for mental health problems (Holley et al., 2016). That we found significant effects only for African

American and Black participants might be due to limited variance among other ethnic identities. Due to an insufficient number of studies per ethnical identity group, we were also unable to conduct moderator analyses for all ethnic identities. Additionally, GNC and nonbinary gender roles might be more legitimated in some cultural contexts, such as the fa'afafine in the Samoan culture (Kanemasu & Liki, 2021). These differences in the acceptance of GNC might be related cultural differences, with ethnic identity being partly a proxy of cultural effects. Future primary studies should examine the interplay of culture and ethnic identity in greater depth.

3.5.3.3 Participants' Age

Our findings suggest no moderator effect for mean sample age. This finding is unexpected, as it has often been discussed that experiences of stigmatization affect individuals differently at various life stages. However, comparisons using mean sample age are limited due as high age variance within individual samples is not reflected in mean ages. Further studies involving diverse age groups and individual participant data meta-analyses might provide more valid conclusions. We also used age as a proxy for potential differences in GNC acceptance over time (i.e., cohort effects), with our results finding no evidence for such a change over time; this is further supported by the absence of a moderator effect for publication year. These findings are somewhat surprising given the increased tolerance towards homosexuality over the past decades (Collins et al., 2023; Keleher & Smith, 2012). Our results may reflect differences in the change in tolerance towards GNC compared to homosexuality. While we were not able to identify a study specifically examining temporal dynamics in the acceptance of GNC and homosexuality, there is evidence that greater tolerance of homosexuality does not necessarily correlate with greater liberalism in general (Collins et al., 2023). Future studies should further explore these temporal dynamics in acceptance over time.

In summary, our analyses suggest individual-level moderators have only minor importance. The only notable effect emerged for ethnic identity, with stronger associations in samples having a higher proportion of African American and Black individuals. In contrast to our expectations and earlier claims (e.g., Plöderl & Fartacek, 2009; van Beusekom et al., 2018), the association of GNC and

mental health was independent of gender (identity) and sexual orientation. Future meta-analyses using individual participant data would be more suitable for the study of these moderators.

3.5.4 Methodological Factors Associated with the Relationship between GNC and Mental Health

Beyond GNC measure type, evidence on methodological moderators was rare due to small between-study variation for some methodological aspects. For behavior-based GNC measures, we found a moderator effect for report type (self- vs. other-report), with reports from other persons leading to greater correlations than self-reports. These differential effects might be due to the overestimation of the link between GNC and poorer mental health by parents (Sandnabba & Ahlberg, 1999). Moreover, there might be a tendency to rely more on visible and behavioral indicators in reports by other persons, which in turn are more closely related to the social experiences accounting for GNC-related mental health effects. We found no moderator effect in the assessment and operationalization of mental health. This suggests that the choice of mental health measure has no significant influence on the relationship between GNC and mental health, with similar associations being found for a large number of symptoms.

3.5.5 Limitations

In addition to the strengths of our systematic review, it is important to consider the limitations of our findings. First, the effect estimates synthesized in this review were (mostly cross-sectional) bivariate correlations. Correlations do not allow the drawing of causal conclusions, and we could not rule out the possibility that there is no causal link at all or that mental health affects GNC. However, available longitudinal studies (e.g., Mahfouda et al., 2023; Narita et al., 2024; Roberts et al., 2012b; Roberts et al., 2013; Warren et al., 2019; Warren et al., 2022) provide evidence for prior GNC predicting later mental health problems, with psychosocial stressors such as abuse, bullying and relationship quality account for this link. Thus, our analyses based on zero-order correlations are statistically not suitable to identify the direction of the relationship between GNC and mental health, empirical evidence for an inverse link from mental health to GNC is lacking. Moreover, we cannot rule out an unobserved third variable accounts for the association between GNC and mental health.

This also accounts for the moderator analyses that reflect correlations with effect estimates, which might in many cases show noncausal links. Some of the moderators are likely to reflect proxies of other, potentially causal variables.

Second, our literature search might constitute another limitation. In line with recent recommendations (Deeks et al., 2019), we searched a total of five databases, but we may have missed a few eligible studies. To compensate for these limitations, we also contacted authors from primary studies in the field, as well as searching the citations of eligible primary studies and thematically related systematic reviews (Hu et al., 2023; Thoma et al., 2021), which resulted in an additional 27 eligible studies. In our research, we found predominantly English-language studies, with only one non-English article in the final dataset. A mono-language bias can therefore not be ruled out, although we did not exclude other languages at any stage. Moreover, we were unable to retrieve all full texts, which might have provided further effect estimates relevant to our research question.

Third, the samples included in this systematic review were heterogeneous (e.g., clinical and nonclinical samples, different sexual orientations, countries, and ethnicities). We did not impose strict inclusion criteria for the population to provide a comprehensive overview and examine a broad range of moderators; however, this may have resulted in the combination of heterogeneous groups for whom the association between GNC and mental health might differ. Although we attempted to control for some of these differences by moderator analyses, we admit that other methodological (e.g. sampling strategy, recruiting context) or sample-specific factors (e.g., socioeconomic status, individual income, or education) may have affected the association between GNC and mental health. Although we gathered information on some of these variables, we excluded them from statistical analyses due to limited variance and low comparability between the primary studies. Moreover, for some moderator analyses only a small number of studies was available, resulting in low statistical power and a higher risk of biases due to outliers. We addressed this limitation by setting a minimum of five studies per subgroup. However, the results of these moderator analyses might be affected by

the low statistical power, for example, resulting in false-negative and/or false-positive findings (Harrer et al., 2021; Stanley et al., 2022). In addition, we were unable to perform some of the planned moderator analyses due to the small number of primary studies. Future research syntheses should address these gaps based on a larger number of primary studies.

Fourth, internal bias may have affected our findings. Although the overall study quality was moderate to high, shortcomings were identified in the participation rates and statistical power. We conducted sensitivity analyses to examine the potential impact of risk of bias and limited our database solely to high-quality studies. For the link between GNC and mental distress, this hardly affected our findings; only for participation rates did associations turn nonsignificant when limiting our database to high-quality studies. For the correlation between GNC and self-esteem, the sensitivity analyses pointed to a stronger impact of bias. In some cases, the correlation became nonsignificant, while in others, the association became stronger. Future high-quality studies should therefore replicate these findings.

Fifth, we decided to combine several mental health outcomes into the broader category of mental distress, which has also been done in other systematic reviews examining a larger range of symptom measures (Petrocchi et al., 2024; Schäfer et al., 2024; Zhang et al., 2022). Our rationale for this decision was that the correlations between GNC and mental health are at least partly driven by common underlying mechanisms—that is, stressor exposure related to stigmatization of GNC. While we examined the link between GNC and mental distress for single symptom domains, those were combined for later moderator analyses. This might be critical, as moderators may vary between symptom types. In our review, the number of studies per symptom was often small, thus prohibiting moderator analyses at the single outcome level. Future systematic reviews therefore need to test the robustness of moderator effects across single outcome types.

Sixth, for this review, we highlighted the potential key role of negative social experiences for the link between GNC and mental health. However, we have not included this link in our meta-analysis, as the evidence base for such models is still rare, and a previous meta-analysis already

provided support for the link between GNC and victimization (as one potential type of negative social experience; Hu et al., 2023; Thoma et al., 2021). Our findings on GNC measure type and other-reports represent preliminary support for the potential relevance of (negative) social experiences; however, based on a sufficient number of yet-to-be-conducted primary studies, future meta-analyses examining a mediation via social experiences are needed for a full picture of evidence.

3.5.6   *Recommendations for Future Research*

First, our systematic review supports the strong need for future studies shedding light on GNC and its components, which has also been identified in previous work (Lehavot, King, & Simoni, 2011; Liben & Bigler, 2008). In particular, our findings of inverse associations for behavior- and personality-based GNC measures underscore the need for conceptual clarity as those are often not differentiated in the literature.

Developing GNC measures that asses multiple GNC components might be helpful to understand differences between social acceptance and stigmatization of various aspects of GNC and their relationship with mental health. Future research should also improve conceptual clarity by using terms specifically addressing GNC components as opposed to using GNC as a broad umbrella term.

Second, there is a need for multinational studies that include middle- and low-income countries from more than two continents to examine the impact of cultural factors based on within-study analyses and to assess the full range of cultural dimensions. Such studies would enhance the understanding of how cultural context may affect the relationship between GNC and mental health and would increase the generalizability of findings on cultural dimensions. However, in some countries, such studies might put researchers and participants at risk, which should be avoided at any costs.

Third, systematic reviews and meta-analyses would benefit from more transparent reporting in primary studies including the provision of correlations for subgroups (e.g. different genders, sexual orientations, ethnic identities) to provide deeper insights into the importance of individual factors.

Future studies should also include more recent conceptualizations of gender, including non-binary and genderfluid identities. Most of the included primary studies did not assess or report these subgroups separately or combined them with other genders due to sample size limitations (e.g., Keng et al., 2017; Mustanski & Liu, 2013), which hinders direct comparisons of these groups. Yet, such analyses that move beyond traditional binary conceptualizations of gender are needed.

Fourth, there is a need for longitudinal studies investigating the temporal interplay between GNC and mental health. Such studies should also examine negative social experiences (e.g., stigmatization, victimization) and other potentially mediating mechanisms. Such research would help to study causal dynamics and may thereby provide a starting point for potential prevention measures targeting negative social experiences.

3.5.7 Conclusions

This is the first systematic review and meta-analysis to summarize the evidence on the relationship between GNC and mental health. Our findings point to the often-neglected complexity of GNC: Effect estimates ranged between negligible to small associations and varied in direction and magnitude, which suggests that there is no simple answer to the question of how GNC relates to mental health and vice versa. Our findings support the role of methodological, cultural, and individual factors affecting this relationship. The type of GNC measure had the largest impact on the association between GNC and mental health. For behavior-based measures, higher GNC was related to worse mental health, while for personality-based measures, higher GNC tended to be associated with better mental health. Such findings suggest that these measures capture different components of GNC, which may be related to more (in case of behavioral GNC) or less (for personality-based GNC) negative social experiences; this needs to be examined in greater depth in future studies.

Moreover, our analyses suggest a relevant moderation by cultural dimensions, with the magnitude of the associations increasing in societies that are more collectivist, restrictive, uncertainty avoidant, and long-term oriented, irrespective of how GNC was operationalized or the direction of the correlations. At the same time, associations were smaller for societies that accept

individuality, treat individuals, have more flexible gender roles, and do not fear deviations from (gender) norms. This may relate to less negative GNC-related stigmatization in those societies.

Individual factors were of less importance, and we only found a stronger association when higher proportions of African American and Black participants were included. Different gender roles and intersectionality between minority stressors may account for this finding. No differences in the association between GNC and mental health depending on gender (identity) and sexual orientation were found. Our results are limited by the sizable proportion of studies conducted in Western high-income countries, which resulted in substantial variance restrictions for cultural dimensions. Moreover, evidence was rare for some mental health outcomes, thus not allowing for moderator analyses. Future research needs to increase conceptual clarity for GNC, which is likely a multicomponent construct. High-quality—ideally multinational—studies need to examine the complex and multidirectional interplay between GNC, stressor exposure, and mental health to derive evidence on potential causal relationships.

4   Study 2: The Relationship Between Childhood Gender Nonconformity, Childhood

Maltreatment, and Psychological Distress in an Outpatient Sample

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Behavior.

4.1   Abstract

Childhood gender nonconformity (CGNC) has been found to be associated with various

mental health issues, potentially due to stigmatization-related victimization such as childhood

maltreatment (CM). Prior studies in non-clinical samples have shown that individuals with higher

levels of CGNC report more experiences of CM, with CM mediating the link between CGNC and

mental health outcomes. This study aimed to replicate these findings in a clinical sample of 75

outpatient psychotherapy patients, examining the relationship between CGNC, CM, and

psychological distress in adulthood. Results indicated that the association between CGNC and

psychological distress was partially mediated by CM scores, supporting findings from non-clinical

samples. These results suggest that CM contributes to increased psychological distress in adulthood

in outpatients reporting higher levels of CGNC. Future longitudinal studies are needed to shed light

on potential causal relationships and develop interventions to mitigate the mental health impact of

CGNC-related stigma.

4.2   Introduction

Gender nonconformity is the extent to which a individuals gender expression differs from

stereotypes and norms associated with its assigned gender (American Psychological Association,

2015). In childhood it is referred to as childhood gender nonconformity (CGNC; Roberts et al.,

2012b). Higher levels of (childhood) gender nonconformity have been found to be associated with

several mental health problems over the lifespan, as demonstrated by cross-sectional (Alanko et al.,

2008; Folkierska-Żukowska et al., 2022; Issler, Ferreira de Sá et al., 2023; Zhao et al., 2021) and

longitudinal studies (Mahfouda et al., 2023; Narita et al., 2024; Oginni et al., 2019; Roberts et al., 2013). Recent meta-analyses on the relationship between gender nonconformity and mental health suggest small correlations between higher levels of (childhood) gender nonconformity and more mental distress (Issler, Michael et al., 2023; Xu et al., 2024). However, CGNC is not expected to be the origin or cause of those mental health problems. Rather, it is assumed that psychosocial stressors grounded in social stigmatization of individuals perceived as gender nonconforming are the primary driver of high rates of mental health problems among people experiencing CGNC (Meyer, 2003; Hatzenbuehler, 2009; Timmins, 2021). These psychosocial stressors are present in various life domains and affect interactions with teachers (Fagot, 1977), peers (Roberts et al., 2013; Smith & Juvonen, 2017; Landolt et al., 2004; Cohen-Kettenis et al., 2003; Green, 1976), and parents (Alanko et al., 2009, Landolt et al., 2004). Meta-analyses suggest significant small associations between (childhood) gender nonconformity and these psychosocial stressors (Hu et al., 2023; Thoma et al., 2021). It is likely that this manifold and persistent exposure to stress has a long-lasting negative impact on mental health (Hamby et al., 2021).

One psychosocial stressor that could be of particular importance for the relationship between CGNC and mental health are experiences of childhood maltreatment (CM). CM refers to the abuse and neglect of persons under the age of 18 and can be distinguished into four types: physical abuse, the violation of physical integrity, emotional abuse, the violation of emotional or psychological integrity, sexual abuse, the involvement of a child in sexual activities, and neglect, that is, the failure of caregivers to take care of the child's development and health (World Health Organization, 2022). CM is a relatively common phenomenon, although the prevalence varies greatly across countries and between genders (Moody et al., 2018). CM is known to have severe consequences for individuals' development (Afifi et al., 2009, 2016), some of which persist over their lifetime (Gilbert et al., 2009; Jonson-Reid et al., 2012; Widom, 2013). For example, CM was found to be associated with multifaceted health issues including physical (e.g., Afifi et al., 2016), cognitive (e.g., Pechtel & Pizzagalli, 2011), behavioral (e.g., Berzenski & Yates, 2011; Choi et al., 2017), and

social problems (Pfaltz et al., 2022), which can increase the risk for mental health problems across

the lifespan (Angelakis et al., 2020; Humphreys et al., 2020; Gardner et al., 2019). In particular, the

exposure to multiple forms of CM (e.g., experiencing emotional and sexual abuse) is associated with

more severe negative mental health consequences (Hodgdon et al., 2018). Thus, it is not surprising,

that those affected by CM exhibit more psychological distress (Spinhoven et al., 2016) and increased

prevalence rates of trauma-related disorders, depression, anxiety disorders, and suicidal behaviors

(Afifi et al., 2009; De Bellis, 2001; Gardner et al., 2019; Lang & Sharma-Patel, 2011; Widom, 2013).

CM might be also a relevant factor in the relationship between CGNC and mental health, as

prior studies suggest a positive correlation between higher levels of CGNC and the experience of CM

(Roberts et al., 2012b, Bos et al., 2019, Plöderl & Fartacek, 2009; Issler, Ferreira de Sá et al., 2023, Xu

et al., 2020; Warren et al., 2022) and a mediating effect of CM in the association between CGNC and

several mental health outcomes (Issler, Ferreira de Sá et al., 2023; Plöderl & Fartacek, 2009; Roberts

et al., 2013; Warren et al., 2022; Zhao et al., 2021). Although, these findings show a certain

heterogeneity of the association depending on gender, sexual orientation, and type of CM, overall,

previous studies indicate a positive correlation between CGNC and CM.

In summary, we assume that higher levels of CGNC are associated with higher levels of

psychological distress. Based on prior studies we suggest, that greater CGNC is correlated with more

severe CM experiences. Furthermore, it is likely that CM resulting from the social stigmatization of

CGNC makes individuals more vulnerable to psychological distress.

However, this is the first study to examine this link in an outpatient sample. This appears to

be relevant because there may be differences in the relationships between clinical and non-clinical

samples. First, clinical samples might tend to report more traumatic experiences as well as more

severe mental health problems (Struck et al., 2020). This might affect the size of the correlations, but

also floor or ceiling effects might be conceivable. Second, many studies on the relationship between

CGNC and mental health have been conducted in samples that tend to report higher levels of CGNC

such as gay men (e.g., Feinstein et al., 2012). To determine whether these associations also hold in

general outpatient samples and to provide implications for psychotherapeutic practice, further research with non-selected clinical populations is needed.

Therefore, we aim to replicate previous findings on the associations between CGNC, CM, and mental health problems in an outpatient sample. This leads to the following hypotheses:

1. Patients who recall higher levels of CGNC also report higher levels of psychological distress. Based on prior studies, we expect a small positive correlation between CGNC and psychological distress.

2. Patients who recall higher levels of CGNC also report higher levels of CM. Based on prior studies, we expect a small positive correlation between CGNC and CM.

3. Patients who remember more experiences of CM also report more severe psychological distress in adulthood. Based on prior studies, we expect a small positive correlation between CM and psychological distress.

4. The relationship between CGNC and psychological distress is mediated via CM, whereby higher levels of CGNC are associated with more CM, which in turn lead to more severe psychological distress.

Furthermore, we want to examine the influence of different types of CM, that is neglect, physical abuse, emotional abuse, and sexual abuse by examining the proposed mediation for single CM subtypes. Due to the heterogeneous findings of previous studies, we do not have a hypothesis for this question but examine it on an exploratory basis.

4.3   Methods

4.3.1   Study Design and Sample Recruitment

The participants were outpatients at either a university psychotherapy outpatient clinic or the outpatient clinic of a state-licensed training institute for cognitive behavioral therapy in South-West Germany. All patients who were receiving treatment at time of the study were asked by their therapists if they wanted to participate in the study. In addition, posters were hung in the outpatient clinics and flyers were available asking the patients to contact their therapists about the study. If

patients provided informed consent to study participation, they could decide whether to complete

the questionnaire online or as a paper-pencil version. Participants received a €10 voucher for

successful participation and therapists received an expense allowance of €7.50 per recruited

participant. Data collection took place from November 18, 2020, to July 23, 2021, as part of a larger

study aimed at validating the German version of the ISPCAN Child Abuse Screening Tools-

Retrospective (ICAST-R; Dunne et al., 2009; Jarczok et al., 2022). Eighty patients completed the 40-

minute online survey. Four participants were excluded since they indicated that they do not identify

with any gender category. In these cases, the CGNC questionnaire could not be assessed, as it uses

gender-specific items. One participant was excluded because of missing data on psychological

distress. The final sample comprised 75 participants, of whom 63 (84.00%) completed the online

questionnaire. The study protocol was approved by the ethics committee of Saarland University (no.

21-20). All respondents gave written informed consent in accordance with the Declaration of Helsinki

and its latest revisions (World Medical Association, 2013).

4.3.2   Measures

4.3.2.1   Sociodemographic Data

Participants reported on their gender, sexual orientation, and age. Additionally, we assessed

educational level on a 5-point scale ranging from "no school leaving certificate" to "(technical)

university degree".

4.3.2.2   Childhood Gender Nonconformity

The German translation of the Recalled Childhood Gender Identity/Gender Role

Questionnaire (RCGIGRQ; Plöderl et al., 2007; Zucker et al., 2006) was used for the assessment of

CGNC. After a short piloting phase, we made a small change to the translation for better

comprehensibility (see Supplementary Material SM-1). The 2-factor RCGI comes in a male and female

version, with both versions consisting of 23 items, 9 of which being gender-specific. The items were

rated on a 7-point Likert scale from "strongly disagree" to "strongly agree". We used Factor 1

containing items related to gender identity for the assessment of CGNC, while Factor 2 focuses on

the parent-child relationship and was thus not used for our analyses. We created a sum score of the respective items with lower values indicating greater CGNC. In the present sample, the internal consistency of Factor 1 was acceptable to good, reflected in Cronbach's alpha (α) of 0.72 and McDonald's omega (ω) of 0.76.

4.3.2.3   Childhood Maltreatment

Childhood maltreatment was assessed using the German version of the ICAST-R (Dunne et al., 2009; Jarczok et al., 2022), which is a 28-item self-report measure. The ICAST-R asks for emotional abuse, physical abuse, sexual abuse, emotional and physical neglect. Participants were asked if a particular abuse experience had ever occurred up to the age of 18, whereby participants could then choose between "yes", "no", and "I can't remember". If participants responded with "yes", they were asked to indicate the age at which the CM occurred, its frequency, the perpetrator, and the perceived harm caused by the abuse. For the present study, we created a score of the number of CM experiences with higher scores indicating more severe CM.

4.3.2.4   Psychological Distress

Psychological distress was measured by the German version of the Brief Symptom Inventory (BSI; Derogatis, 1993; Franke, 2000). The BSI uses 53 items to measure subjectively perceived psychological distress due to physical and psychological symptoms over the past seven days. Each item is rated on a 5-point Likert scale ranging from "not at all" to "very strong". We used the Global Severity Index (GSI) as an indicator for psychological distress, summarizing information on the number of symptoms and their severity. Higher scores of the GSI represent greater psychological distress. In the present study, the GSI showed excellent internal consistency, $\alpha = 0.96$, $\omega = 0.97$.

4.3.3   Data Analyses

Analyses were conducted using *R* version 4.3.2 (R Core Team, 2022). Patterns of missing data (i.e., missing completely at random, missing at random, not missing at random) were examined using the *RBtest* package (Rouzinov & Berchtold, 2020). To analyze the relationships between CGNC, CM, and psychological distress, we employed mediation models using the *lavaan* package (Rosseel,

2012). All predictors were standardized prior to analysis, and all analyses were controlled for the association of age and education with psychological distress. We examined the association between CGNC and CM (*a*-path), the association between CM and psychological distress (*b*-paths), and the relationship between CGNC and psychological distress (*c*-path, i.e., direct effect). Indirect effects were examined as a product of the *a*- and *b*-paths, with a significant *a*b* path coefficient being interpreted as evidence for a mediation effect (Zhao et al., 2010). To account for potential influence of the sample size (Preacher et al., 2007), we estimated direct, indirect, and total effects, standard errors, and 95% CIs based on 1,000 bias-corrected bootstrapped samples.

4.4   Results

4.4.1   Sample Characteristics

The mean age of participants included in the analyses (*n* = 75) was 36.69 years. Of these participants, 42 identified themselves as being women (56.0%) and 33 as being men (44.0%). Most participants reported to be heterosexual. Table 12 summarizes the descriptive statistics of the relevant study variables, subdivided for the total sample, men and women. In total, 0.14% of the data were missing.

4.4.2   Comparison of Self-Identified Women and Men

First, we tested whether there are gender differences for the most relevant study variables (see Table 12). When we compared mean levels between self-identified women and men, women reported higher levels of CGNC and more severe psychological distress. Also, women reported more sexual abuse. No further gender differences were found for other variables.

Table 12. *Descriptive Statistics Separated by Full Sample, Women and Men Sample*

Descriptive Statistics	Range	Full sample (*n* = 75)	Women (*n* = 42)	Men (*n* = 33)	Comparison women versus men (*t*-test)
Mean age (years)	17.00-69.00	36.69 ± 13.58	35.21 ± 13.50	38.58 ± 13.64	*t*(68.53) = −1.06, *p* = .291
Primary diagnoses (according to ICD-10)					
Organic affective disorders		1	1	0	
Substance use		1	0	1	
Affective disorders		23	12	11	
Anxiety disorders		9	2	7	
Obsessive-compulsive Disorders		3	2	1	
Reactions to severe stress		10	6	4	
Somatoform disorders		2	0	2	
Eating disorders		1	1	0	
Personality disorders		4	4	0	
Hyperkinetic disorders		1	0	1	
Not reported		20	14	6	
Comorbidities					
Yes		17	9	8	
No		38	19	19	
Not reported		20	14	6	
Educational level (mean ± standard deviation)	1.00-5.00	3.72 ± 1.02	3.67 ±1.10	3.79 ±0.93	*t*(72.58) = −0.52, *p* = .606
No school leaving certificate		0 (0.0%)	0 (0.0%)	0 (0.0%)	
Primary/lower secondary school certificate		10 (13.3%)	7 (16.7%)	3 (9.1%)	
Secondary school certificate (intermediate level)		22 (29.3%)	13 (31.0%)	9 (27.3%)	
(Technical) High school diploma		22 (29.3%)	9 (21.4%)	13 (39.4%)	
(Technical) University degree		21 (28.0%)	13 (31.0%)	8 (24.2%)	

Sexual orientation					
Heterosexual		60 (80.0%)	33 (78.6%)	27 (81.8%)	
Bisexual		7 (9.3%)	5 (11.9%)	2 (6.1%)	
Homosexual		4 (5.3%)	1 (2.4%)	3 (9.1%)	
Not sure		4 (5.3%)	3 (7.1%)	1 (3.3%)	
Childhood gender nonconformity	31-84	57.48±9.98	53.50±7.97	64.03±8.37	$t(67.20) = -6.13, p < .001$
Childhood maltreatment					
Index score	0-16	4.49 ± 4.03	5.19 ± 4.26	3.61 ± 3.58	$t(72.64) = -1.75, p = .084$
Emotional abuse	0-5	1.75 ± 1.62	2.05 ± 1.59	1.36 ± 1.60	$t(68.76) = 1.84, p = .070$
Neglect	0-5	0.72 ± 1.17	0.79 ± 1.18	0.64 ± 1.17	$t(69.18) = -0.55, p = .586$
Physical abuse	0-4	1.17 ± 1.12	1.19 ± 1.06	1.15 ± 1.20	$t(64.48) = 0.15, p = .884$
Sexual abuse	0-5	0.85 ± 1.28	1.17 ± 1.46	0.45 ± 0.87	$t(68.41) = 2.62, p = .011$
Psychological Distress	0-3.40	1.14±0.69	1.32±0.73	0.91±0.56	$t(72.97) = 2.76, p = .007$

Note. The table provides an overview of the descriptive statistics. Values are presented as means and standard deviations or absolute values and percentages. Individuals were more gender-

nonconforming when CGNC score were lower.

Second, we compared the correlations for the study variables between women and men. We found a between-gender difference for the correlation between CGNC and the CM index score, $z = -2.38$, $p = .017$, with a stronger negative correlation being found for women. Also, the correlations between CGNC and sexual abuse, $z = -2.62$, $p = .009$, differed between gender. Further gender differences were found for the intercorrelations of the ICAST-R questionnaire. Men showed smaller intercorrelations for the CM index score and sexual abuse, $z = 2.06$, $p = .039$, sexual and emotional abuse, $z = 2.10$, $p = .036$, and neglect and emotional abuse, $z = 1.98$, $p = .047$.

However, these differences disappeared after applying the Bonferroni correction. There was no further evidence for between-gender differences for other correlations (see Table 13). Thus, our subsequent analyses were based on linear regression models including participants of both genders.

4.4.3   Bivariate Relationships

Figure 18 shows the significant bivariate relationships between all variables included in the present analyses for the total sample. There was a medium-sized positive correlation between more CGNC and greater psychological distress. Also, CGNC showed moderate positive associations with the CM index score and its subcategories, except for physical abuse. As expected, higher CGNC was associated with more experiences of CM. We found a medium-sized positive correlation between the CM index score and greater psychological distress. Also, all subcategories of CM showed medium-sized correlations with psychological distress. The covariates age and education were intercorrelated, with the level of education decreasing as age increased. Age was not correlated with any other variable. However, individuals with lower education reported higher levels of CM as well as greater psychological distress.

Table 13. *Correlations Between Study Variables for Self-identified Women and Men.*

A. Pearson correlations	1.	2.	3.	4.	5.	6.	7.
1. Childhood gender nonconformity	-	−.62	−.48	−.43	−.53	−.52	−.38
2. CM: Index score	−.14	-	.83	.65	.91	.78	.54
3. CM: Neglect	−.07	.71	-	.34	.73	.56	.45
4. CM: Physical abuse	−.06	.85	.44	-	.57	.28	.49
5. CM: Emotional abuse	−.25	.82	.43	.61	-	.56	.40
6. CM: Sexual abuse	.06	.49	.17	.41	.13	-	.43
7. Psychological distress	−.25	.50	.50	.40	.34	.22	-
B. Between-gender comparisons (*p*-values)							
1. Childhood gender nonconformity	-						
2. CM: Index score	.017*	-					
3. CM: Neglect	.063	.210	-				
4. CM: Physical abuse	.102	.050	.636	-			
5. CM: Emotional abuse	.169	.112	.047*	.856	-		
6. CM: Sexual abuse	.009*	.039*	.058	.530	.036*	-	
7. Psychological distress	.542	.808	.819	.641	.786	.324	-

Note. A. Pearson correlations (*r*) per self-identified gender, with correlations for women above the diagonal and for men below the diagonal. B. Between-gender comparisons of correlation coefficients with *p*-values of respective Fisher's *z* tests (no correction for multiple comparisons has been applied). Non-significant correlations point to no between-gender differences. * = $p \leq$ .05, non-significant after applying the Bonferroni correction.

Figure 18. *Graphical Illustration of Bivariate Pearson Correlations Between All Study Variables.*
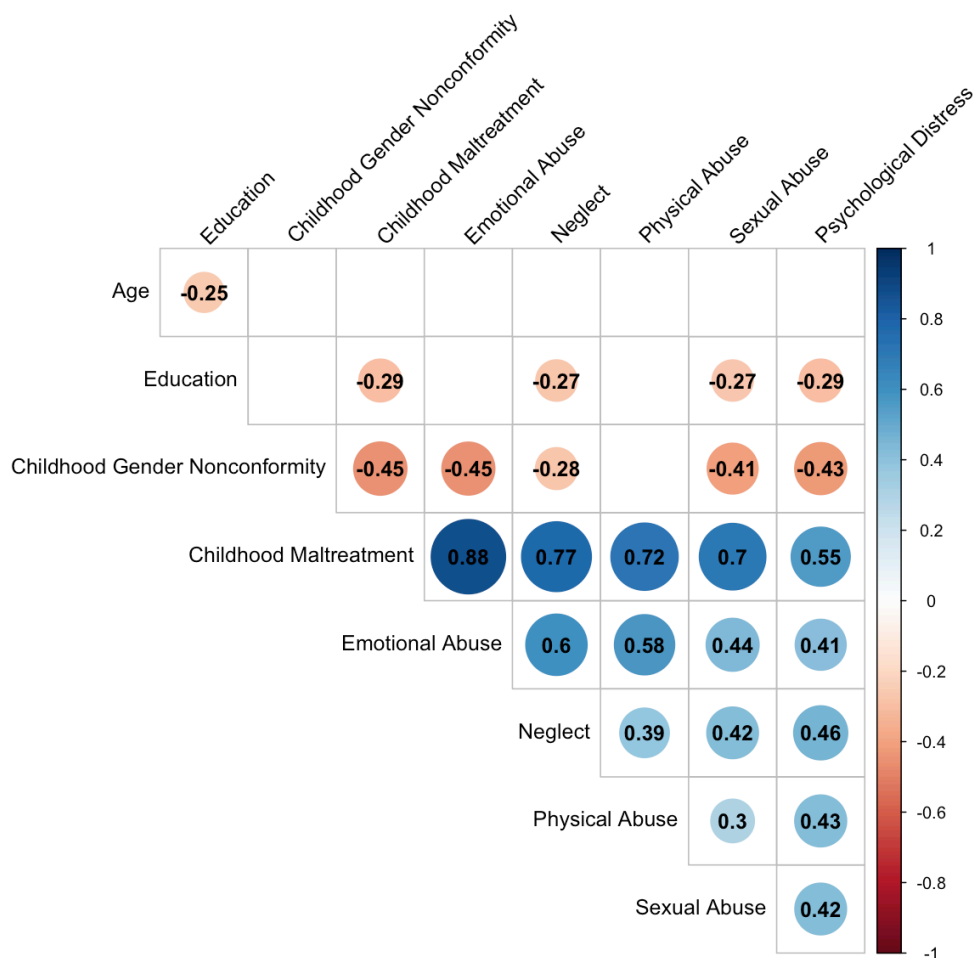
Note. Non-significant correlations are blank. All correlations presented in the figure were significant at *p* < .05. Smaller CGNC scores represent a higher level of CGNC.

4.4.4 Mediation Models

We found a significant total effect, *a*b+c* = –0.28, 95% CI [–0.42, –0.13], *p* < .001. CGNC significantly predicted[3] CM, *a* = –0.45, 95% CI [–0.65, –0.23], *p* < .001, and CM was found to be significantly associated with psychological distress, *b* = 0.29, 95% CI [0.13, 0.45], *p* < .001, together accounting for a significant indirect effect, *a*b* = –0.13, 95% CI [–0.26, –0.05], *p* = .009 (see

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[3] Within the Results section, the term "predicted" is used to describe the results of regression models and should not be misinterpreted as a causal relationship.

Figure 19). The direct effect of CGNC on psychological distress remained significant, c = –0.15, 95% CI [–0.27, –0.012], p = .025, indicating a partial mediation. The proportion mediated revealed that approximately 47.5% of the total effect was explained by the indirect path. The total variance explained by the model was R^2 = 0.35, of which 16.6% of the variance was attributable to the indirect path via CM. There was neither an effect of age nor educational level on psychological distress. In summary, these results indicate a partial mediation of CGNC on psychological distress via CM.

Figure 19. *Mediating Role of Childhood Maltreatment in the Association of Childhood Gender Nonconformity and Psychological Distress*
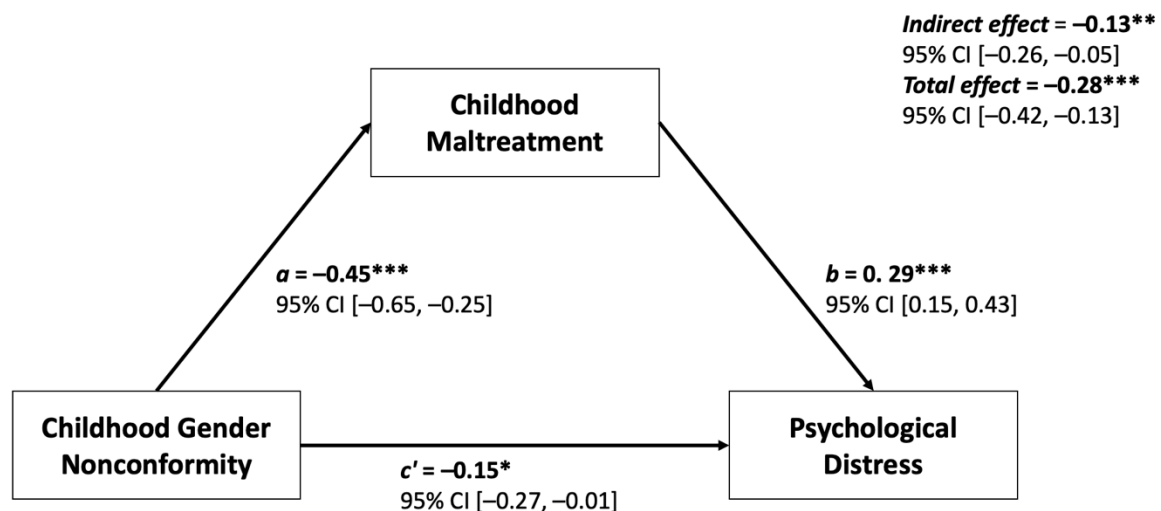
Note. Level of significance: * p < .05; ** p < .01; *** p < .001

Furthermore, we checked on exploratory basis for differential effects depending on the type of CM. In these analyses, we found no significant indirect effects for emotional abuse, $a*b$ = –0.08, 95% CI [–0.18, –0.02], p = .057, neglect, $a*b$ = –0.07, 95% CI [–0.20, –0.01], p = .133, physical abuse, $a*b$ = –0.05, 95% CI [–0.13, –0.002], p = .107, or sexual abuse, $a*b$ = –0.08, 95% CI [–0.18, –0.02], p = .061. More details on the analyses can be found in the Supplemental Material (SM-2-5).

4.5   Discussion

This study investigated the associations between CGNC, CM, and psychological distress in a German outpatient sample. We hypothesized that patients who recalled more CGNC also report higher levels of psychological distress in adulthood and that this relationship is mediated via experiences of CM. Furthermore, we checked on exploratory basis for differential effects depending on the type of CM. In line with our hypotheses, we observed significant associations between CGNC, CM and psychological distress with effect sizes varying between small to medium (Cohen, 1988). Notably, the associations in our sample seem to be numerically stronger than those reported in previous non-clinical studies, which found mostly small associations (e.g., Alanko et al. 2008; van Beusekom et al., 2018). The stronger association in the present study might result from the higher prevalence of CM in psychotherapy patients (Struck et al., 2020). Therefore, our findings provide initial evidence that recalled CGNC may also serve as an indicator for an increased risk for both CM and psychological distress in an outpatient population.

As hypothesized, we also found a significant mediation effect of CM for the relationship between CGNC and psychological distress. Since we observed a partial mediation, this supports the notion that CM may serve as a critical factor in this relationship. Overall, the indirect path accounted for 47.5% of the total effect. Our findings align with previous studies, which also identified a significant indirect effect via CM in the relationship between CGNC and mental health (e.g., Zhao et al., 2021). However, the partial mediation suggests the potential relevance of additional variables in this association, such as bullying (Narita et al., 2024, Roberts et al., 2013, Zhao et al., 2021) and social exclusion (Narita et al., 2024). Additionally, it is plausible that changes in internal processing mechanisms that have emerged as a consequence of these experiences act as additional stressors, influencing mental health outcomes. Such mechanisms may include the internalization of gender and heterosexist norms (Thoma et al., 2021; Timmins et al., 2020) or the concealment of GNC-related aspects (Thoma et al., 2021).

These findings support theoretical assumptions (e.g., Martin-Storey, 2016; Meyer, 2003) and is in line with empirical evidence from longitudinal studies (e.g., Mahfouda et al., 2023; Narita et al., 2024; Roberts et al., 2012b; Roberts et al., 2013; Warren et al., 2019; Warren et al., 2022), that it is likely that psychosocial processes such as prejudice and stigmatization of CGNC are causally involved in this relationship. Prejudices against CGNC likely increase the risk for experiencing CM (e.g., Issler, Ferreira de Sá et al., 2023, Plöderl & Fartacek, 2009), which in turn contributes to various problems and impairments in affected individuals, thereby increasing their vulnerability to psychological distress (Pfaltz et al., 2022). For example, Bos et al. (2019) suggested that parents who feel discomfort with their child's CGNC perceive the child as failing to meet their expectations (Kane, Spade, & Valentine, 2008; Sandnabba & Ahlberg, 1999), or view CGNC as indicative of a potential same-sex orientation (Kane et al., 2008). In family systems the risk for CM increases, possibly as an effort to alter the child's CGNC or sexual orientation.

Our findings highlight the impact of psychosocial processes on mental health and provide initial implications for outpatient psychotherapy. Patients reporting CGNC should be assessed for possible experiences of CM and their potential long-term health effects. Psychotherapeutic interventions could aim to mitigate the negative impact of past CM and enhance protective factors such as resilience (Issler, Ferreira de Sá et al., 2023). However, long-term protection of individuals with CGNC can only be achieved at the societal level by reducing the stigmatization of CGNC using multi-level interventions (Cramwinckel et al., 2018; Rao et al., 2019).

In contrast to the CM index score, our exploratory analyses did not reveal significant mediation effects for the subtypes of CM. This finding is somewhat unexpected, as previous studies in non-clinical samples have indicated significant mediation effects for these subtypes (Warren et al., 2022). At the same time, the associations varied between studies, suggesting a heterogeneous picture (e.g., Issler, Ferreira de Sá et al., 2023, Plöderl & Fartacek, 2009; Warren et al., 2022; Zhao et al., 2021). These differences may be influenced by sample characteristics, cultural factors, the operationalization of variables, and analytical approaches. Additionally, due to the small sample size

it was also not possible for us to examine potential moderation effects of gender, sexual orientation, or mental health diagnoses. This would have required more complex models, such as multigroup models, which demand a larger sample size. Future studies that control for these factors are necessary to draw more definitive conclusions.

4.5.1   Limitations

Besides being the first study to examine the link between CGNC, CM and psychological distress in an outpatient sample, some limitations of our study have to be taken into account. First, data collection took place from November 18, 2020, to July 23, 2021. During this survey period the COVID-19 pandemic negatively impacted the life and mental health of many people in Germany (Schäfer, Sopp et al., 2022). It cannot be excluded that this influenced the psychological distress of the patients examined in this study. Second, our study used a cross-sectional design. As a result, we assessed both CGNC and CM retrospectively. We cannot rule out that patients' memories may be negatively biased, such as being forgotten, repressed, or faded, which could bias retrospective assessments (Hardt & Rutter, 2004). Future studies should rely on longitudinal - and ideally prospective - designs to allow for more causal conclusions and limit effects of recall biases (Roemmele & Messman-Moore, 2011). Furthermore, it is possible that the mental health status could also influence the patients' self-reports (Hardt & Rutter, 2004). Third, the sample size for calculating the mediation models was not optimal. This may have resulted in our analysis having insufficient power, potentially leading to the inability to detect certain effects, such as the indirect effects of the CM subtypes. This might be due to the nature of the sample as access to outpatients is limited and not all patients want to participate in a time-consuming study. Differences in motivation may also contribute to selection bias and might result in a variance restriction. Fourth, we cannot rule out the possibility that another unobserved variable may influence the relationship between CGNC and psychological distress.

4.5.2   Recommendations for Future Research

Our study was able to show that the relationship between CGNC, CM and mental health, which has been widely studied in non-clinical samples, can also be replicated in a clinical outpatient sample. CGNC thus also appears to be a possible indicator of psychosocial stressors, such as CM, in psychotherapy outpatients. However, our study can only provide preliminary evidence here, as it is the first study to examine a psychotherapy outpatient sample based on a small sample size. Future studies should attempt to replicate these relationships in larger and more diverse outpatient samples, which allow to check for further moderating effects, such as subtypes of CM, gender, or sexual orientation. On the other hand, research on interventions at societal, psychosocial, and individual level is needed to reduce the stigmatization of CGNC and to buffer the multifaceted negative consequences of CM. Additionally, future studies should consider further psychosocial stressors as mediators of the link between CGNC and psychopathological symptoms such as social exclusion, bullying experiences, feeling of loneliness, and the relationship with parents and peers (Narita et al., 2024; Roberts et al., 2013, Zhao et al., 2021).

4.5.3   Summary

The present study was the first showing that the link between CGNC, CM and psychological distress found in non-clinical populations, also translates to an outpatient sample of psychotherapy patients. The link between CGNC and psychological distress was partially mediated via CM index score. Based on theoretical assumptions and prior research, we conclude that CM seems to be the result of the social stigmatization related to CGNG, which in turn might increase the psychological distress in adulthood. Psychotherapist should be aware of this relationship and explore experiences of (social) maltreatment in individuals reporting CGNC. However, we did not find mediation effects for the subtypes of CM. Longitudinal research with larger samples is needed to explore the potential causality of this link. Such studies may inspire interventional research on how to buffer negative mental health effects of heightened stressor exposure associated with the social stigmatization.

5   Study 3: The Relationship between Childhood Gender Nonconformity, Aversive Childhood Experiences, and Mental Health in Heterosexual and Non-Heterosexual cisgender men: The Buffering Effect of Sense of Coherence

5.1   Abstract

Childhood gender nonconformity (CGNC) seems to be associated with more mental health problems in adulthood. Previous research has suggested that this link might be mediated via the increased risk for aversive childhood experiences (ACEs) as a negative social reaction to CGNC. However, no study yet examined the role of resilience factors in this relationship. The present study aims to address this gap by examining the potential buffering effect of sense of coherence (SOC). In a German sample of 371 cisgender men, we used mediation models to investigate the relationship between CGNC, ACEs, and mental health problems in adulthood, that is, depressive symptoms, loneliness, and suicidal behavior. We then employed moderated mediation models to examine the buffering effect of SOC on the association ACEs and mental health problems. The results showed that higher levels of CGNC were associated with more severe adult mental health problems, with this link being partially mediated by higher levels of ACEs. For depressive symptoms and suicidal behavior in the last 12 months, we found evidence of a buffering effect of SOC. Higher levels of SOC were associated with a weaker association between ACEs and mental health problems. In contrast, this effect was absent for loneliness and lifetime suicidal behavior. Our study provides evidence that ACEs partly account for the relationship between CGNC and mental health in adulthood. Moreover, we found support for SOC having a buffering effect on this link. Future studies need to examine whether SOC might be an important target for resilience training in those experiencing CGNC. However, sustainable interventions may rather address the negative social reactions to CGNC.

5.2   Introduction

Gender nonconformity describes an experience and behavior that diverges from culturally specific gender stereotypes and roles (Plöderl et al., 2007) In childhood, gender nonconforming behavior is manifested, for example, in the preference for opposite-sex play partners or the adoption of stereotypically opposite-sex roles in fantasy games (Rieger et al., 2008; Zucker et al., 2006). The reactions of the social environment to childhood gender nonconformity (CGNC) are often negative, so CGNC is associated with an increased risk of aversive childhood experiences (ACEs). For example, children with higher levels of CGNC report worse relationships with teachers (Chan, 2022), peers (Bos & Sandfort, 2015; Chan, 2022; MacMullin et al., 2021) and their parents (Alanko et al., 2011; Alanko et al., 2009). They also experience more peer victimization (Chan, 2022; van Beusekom et al., 2020; van Beusekom et al., 2016; Warren et al., 2019; Toomey et al., 2010; Toomey et al., 2014) in particular homophobic name-calling (van Beusekom et al., 2020) and homophobic violence (D'haese et al., 2016) independent of sexual orientation (Ioerger et al., 2015), and more intimate partner violence in adolescence (Adhia et al., 2021). Moreover, CGNC is associated with multiple forms of discrimination (Antebi-Gruszka et al., 2022; Ghavami et al., 2020) and childhood maltreatment (Baams, 2018; Zhao et al., 2021), also by parents (Bos et al., 2019; McGeough & Sterzing, 2018). In their meta-analysis, Thoma et al. (2021) summarized findings from 25 studies on the relationship between gender nonconforming behavior and prejudice events, which include ACEs, in lesbian, gay and bisexual (LGB) samples. They found evidence for a significant positive relationship between gender nonconformity and the frequency of prejudice events (r = .19). In addition, they found evidence for a gender effect, with this relationship being stronger for men (r = .24) than for women (r = .09). Furthermore, effect size estimates depended on the precise operationalization of gender nonconformity, with the effects for gender nonconformity during childhood being larger than for current nonconformity. Even not examined in the meta-analysis, these multifaceted exposures to stress may (partly) account for the finding that children with higher levels of CGNC experience more mental health problems (Carver et al., 2003).

Previous studies have pointed to sex differences when it comes to the (non)acceptance of gender nonconforming behavior, with lower acceptance for male than for female children (D'Augelli et al., 2006; Sanborn-Overby & Powlishta, 2020; but see: Warren et al., 2022). Thus, male children with CGNC experience more severe negative social consequences for their behaviors and, consequently, are exposed to higher levels of stress. The experience of CGNC is more common among LGB individuals (Bailey & Zucker, 1995; Jones et al., 2017; Li et al., 2017) and may partly account for their increased risk of mental health problems and suicidal behavior (Martin-Storey & August, 2016; Plöderl et al., 2006).

However, irrespective of sexual orientation, CGNC has been discussed as a risk factor for ACEs, that is, high levels of stress exposure during childhood. Given the crucial role of early life stress for the onset and persistence of mental health problems (Hamby et al., 2021), CGNC has also been proposed as a risk factor for mental health problems later in life (Roberts et al., 2013). For example, CGNC was found to be associated with lower self-esteem (Oginni et al., 2019; for an overview see: Zentner & von Aufsess, 2022), lower life-satisfaction (Toomey et al., 2010), more intense feelings of loneliness (Hart et al., 2019), more worries (Swift-Gallant et al., 2022), higher levels of neuroticism (Swift-Gallant et al., 2022), and separation anxiety (Swift-Gallant et al., 2022). Furthermore, CGNC is related to more depressive symptoms (Chan, 2022; Folkierska-Żukowska et al., 2022; Ghavami et al., 2020; Mustanski & Liu, 2013; Oginni et al., 2019, Oginni et al.,2022; Roberts et al., 2013; Toomey et al., 2010; Zhao et al., 2021), increased social anxiety (Folkierska-Żukowska et al., 2022; Ghavami et al., 2020; van Beusekom et al., 2016), more posttraumatic stress symptoms (D'Augelli et al., 2006; Roberts et al., 2012b), heavier substance use (Lowry et al., 2018), as well as more suicidal behavior in adolescence (Ioerger et al., 2015; Reinherz et al., 1995; Spivey et al., 2018) and adulthood (Oginni et al., 2019; Plöderl & Fartacek, 2009). Most of these associations are small to medium (Cohen, 1988). Some studies, on the other hand, find no association between (C)GNC and mental health problems (depressive symptoms: e.g., Sandfort et al., 2016; Timmins et al., 2018; social interaction anxiety: e.g., Pachankis & Goldfried, 2006; anxiety: e.g., Sandfort et al., 2016). For example, Cook et al. (2013)

did not find a significant association of current gender nonconformity and depressive symptoms, psychological distress as well as wellbeing in a South African population. These heterogenous findings might be explained by cultural (e.g., country-specific stigmatization of homosexuality, gender equality), methodological (e.g., measure used, reference period), as well as statistical reasons (e.g., linear vs. nonlinear association). For instance, Zentner et al. (2022) found the relationship between CGNC and self-esteem to depend on country-level gender equality, with higher equality being associated with weaker associations.

In addition, previous studies have mostly not differentiated between cisgender and gender minorities in their analyses, which may also contribute to the heterogeneity of study results. First, transgender and self-identified gender nonconforming individuals (e.g., gender queer, gender nonbinary) are subject to additional group-specific stressors (Gender Minority Stress Model; Hendricks & Testa, 2012). Second, some of the questionnaires used are not suitable for gender minorities (Berg & Edwards-Leeper, 2018).

Apart from these heterogeneous findings, the majority of studies point to (C)GNC being associated with higher risk of ACEs and worse mental health. Thus, the question arises as to whether and how the negative impact of ACEs on mental health can be reduced, that is, how resilience can be fostered in this high-risk group. Resilience represents the process of maintaining or quickly regaining good mental health during or after exposure to adversity or trauma (Kalisch et al., 2017). Within this framework of resilience, resilience factors are individual resources that converge into higher-level resilience mechanisms (e.g., positive appraisal, regulatory flexibility), which ultimately protect the individual from potentially harmful effects of stressor exposure (Kalisch et al., 2015; Schäfer, Kunzler, et al., 2022). Sense of coherence (SOC), as the key component of the salutogenesis framework (Antonovsky, 1979, 1987), represents one of the most important resilience factors. SOC is conceptualized as a global orientation that "*expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that one's internal and external environments are predictable and that there is a high probability that things will work out as well as can reasonably be*

expected" (Antonovsky, 1979, p. 10). Individuals with high levels of SOC view their environment as manageable and comprehensible and perceive challenges in life as meaningful (Mittelmark et al., 2022). SOC is supposed to modulate one's position on the continuum between health (*ease*) and *disease* by shaping coping processes and, specifically, the use of internal and external resources for coping (Idan, Eriksson, et al., 2022). Individuals with higher SOC are supposed to use available resources in a flexible and adaptive manner, which results in more successful coping and, in turn, in lower mental distress (Eriksson, 2022). In line with this assumption, recent meta-analyses in adult populations have shown that higher levels of SOC are associated with lower levels of depression and anxiety (del-Pino-Casado et al., 2019) and less severe symptoms of post-traumatic stress (Schäfer et al., 2019). Moreover, a recent meta-analysis covering the age range from childhood to young adulthood, that is, the life phases during which SOC is supposed to develop (see for details on SOC development: Idan, Braun-Lewensohn, et al., 2022) also supported a robust negative association between SOC and psychopathological symptoms at younger ages (Schäfer et al., 2021). Several studies found SOC to show incremental validity beyond other resilience factors (e.g., Grevenstein, Bluemke, et al., 2016; Grevenstein & Bluemke, 2015; Schäfer et al., 2020). To date, the source of SOC's incremental validity is not fully understood but supposed to result from SOC's quality as a composite measure uniquely integrating aspects of control beliefs, self-efficacy and meaningfulness (Grevenstein, Aguilar-Raab, et al., 2016). Individuals with a stronger SOC are more likely to show resilient responses when exposed to stressors; that is, they may experience a mental health shift in the direction of *disease*, but they are more likely to bounce back faster and stronger in the direction of *ease*. In line with this assumption, a recent 1-year prospective study found that SOC buffered the negative mental health impact of the COVID-19 pandemic in the German general population (Schäfer et al., 2020; Schäfer, Sopp, et al., 2022). Moreover, a cross-sectional study of Holocaust survivors found that SOC moderated the impact of childhood trauma on post-traumatic stress symptoms (van der Hal-van Raalte et al., 2008), with a stronger SOC being associated with a less severe impact of childhood trauma on later life post-traumatic stress symptoms. These findings may point to a

buffering effect of SOC that might have the potential to inform future prevention measures in groups exposed to high amounts of stress. Especially in these risk groups, resilience interventions that strengthen individuals' internal resources to better cope with future stressors may help to prevent the onset or persistence of mental health problems (Chmitorz et al., 2018).

The current study is the first to examine the buffering effect of SOC in individuals with experiences of CGNC. Based on prior evidence, we aim to replicate previous findings on the association between CGNC, ACEs, and mental health problems in cisgender men. Additionally, our main aim is to research the moderating effects of SOC in the association between ACEs and mental health problems. The study aims lead to the following hypotheses:

1. Cisgender men with higher CGNC scores report higher levels of mental health problems in adulthood, that is, depressive symptoms, feelings of loneliness, and suicidal behavior.

2. The relationship between CGNC and mental health is mediated by ACE, with higher CGNC scores associated with more ACEs, leading to a higher level of mental health problems.

3. The relationship between CGNC, ACEs, and risk of mental illness is moderated by SOC, with a higher SOC reducing the association of ACEs with mental health problems.

5.3   Methods

5.3.1   *Study Design and Sample Recruitment*

Participants were recruited primarily online. As heterogeneous samples may have driven previous inconsistent findings, we decided to focus exclusively on cisgender men for this study. In order to reach both heterosexual and non-heterosexual men, we contacted various German organizations dealing with men's health in general (e.g., Network boys and men's health) and organizations dealing with LGB issues (e.g., Lesbian and Gay Federation in Germany) to share our study advertisement. In addition, we contacted LGB podcasters who then shared our study

advertisement in their podcasts. Moreover, study advertisements were posted on webpages

addressing students in general (e.g., Facebook groups of German universities and groups for study

recruitment) and LGB persons in particular (e.g., Facebook groups of LGB university groups and LGB

communities). In addition, paper flyers with the study information were distributed in several

German cities. Two versions of the study flyer were used to advertise the study: a neutral version

("Study of Mental Health in Men") and an LGB version ("Study of Mental Health in Homosexual and

Bisexual Men") to reach heterosexual, homosexual, and bisexual men. Participants were additionally

asked to share the survey link with their male friends. As compensation, twenty €15 vouchers were

raffled among the participants. Recruitment took place between February 26 and August 30, 2021.

During this period, 376 individuals finished the 40-minute online survey completely. One person

indicated to be transgender and was thus excluded our analyses. Two participants were excluded

from the sample because they were younger than 18 years and another two were excluded due to

missing data for all variables of interest (i.e., childhood gender nonconformity, ACEs, mental health

problems, sense of coherence). The final sample comprised 371 participants. The study protocol was

reviewed and accepted by the Ethics Committee of the Faculty of Empirical Human Sciences and

Economics at Saarland University (reference No. 21-20). All respondents gave their informed consent

by checking a box in the online questionnaire in accordance with the Declaration of Helsinki and its

latest revisions (World Medical Association, 2013).

5.3.2 Measures

Sociodemographic data. As part of the online survey, participants indicated their gender and

age. Moreover, we assessed educational level on a 7-point scale ranging from "no academic degree"

to "having received a doctorate degree" (see Supplementary Material for details).

Sexual Orientation. A modified version of the Kinsey Scale (Kinsey et al., 1949) was used to

assess sexual orientation. Subjects could choose between eight response options: exclusively

heterosexual, predominantly heterosexual, bisexual, pansexual, predominantly homosexual,

exclusively homosexual, asexual, and other. If subjects chose other, they were asked to specify their

sexual orientation in a text field.

Childhood gender nonconformity. The Childhood Gender Nonconformity Scale (CGNCS; Rieger et al., 2008) was used for the assessment of CGNC. As a German version of the 7-item scale was not available, we prepared a German translation (for details on the translation process and factorial validity, see Supplementary Material). Subjects were asked to rate their agreement with the items in terms of their experience and behavior up to age 12. All items were rated on a 7-point scale from 1 for "strongly disagree" to 7 for "strongly agree." Item responses were summed, with higher scores indicating greater gender nonconformity. In the present sample, the internal consistency of the scale was good, reflected in a Cronbach's alpha (α) of 0.85 and a McDonald's omega (ω) of 0.86.

Aversive childhood experiences. The Childhood Trauma Questionnaire (CTQ; Bernstein et al., 2003; Klinitzke et al., 2011) is a 28-item self-report measure designed to assess ACEs up to the age of 18. The CTQ comprises five subscales: emotional abuse (EA), physical abuse (PA), sexual abuse (SA), emotional neglect (EN), and physical neglect (PN). Items are rated on a 5-point scale ranging from 1 for "never true" to 5 for "very often true." For the present study, we used the CTQ total score as a global severity measure of ACEs, with higher scores indicating more severe adversity. In the current sample, internal consistency of the scale was good, with α = 0.81 and ω = 0.84.

Sense of coherence. SOC was assessed using the 9-item German short version (SOC-L9) of the Antonovsky scales (Antonovsky, 1993; Singer & Brähler, 2007). The unidimensional SOC-L9 uses a bipolar 7-point scale with a verbal anchor at each pole. For SOC-L9 items, there is no precise time frame specified as items refer to global orientations in life. Higher scores indicate stronger SOC. In the current sample, SOC-L9 showed good internal consistency, with α = 0.87 and ω = 0.87.

Depressive symptoms. Depressive symptoms within the last two weeks were assessed using the 9-item German version of the Patient Health Questionnaire (PHQ-9; Gräfe et al., 2004; Spitzer et al., 1999). Each item is rated on a 4-point scale ranging from 0 (= "not at all") to 3 (= "nearly every day"). PHQ-9 scores range from 0 to 27, with higher scores indicating more severe depressive

symptoms. In the present study, the PHQ-9 showed excellent internal consistency, with α = 0.90 and ω = 0.89.

Loneliness. Loneliness was assessed using the German version of the De Jong Loneliness Scale (De Jong Gierveld & Van Tilburg, 2010; Huxhold et al., 2019). The brief 6-item scale assesses emotional and social loneliness using a 4-point scale ranging from 1 for "strongly agree" to 2 for "strongly disagree". A time frame per item is not specified as the scale assesses general feelings of loneliness with higher scores indicating more severe loneliness. In the present study, the De Jong Loneliness Scale showed good internal consistency, with α = 0.83 and ω = 0.83.

Suicidal behavior. Suicidal behavior was assessed using the German version of the Suicidal Behaviors Questionnaire-Revised (SBQ-R; Glaesmer et al., 2018; Osman et al., 2001). The scale comprises four items assessing lifetime suicidal behavior, suicidal behavior in the last 12 months, anticipated likelihood of future suicidal behavior, and threat of suicidal behavior. Items are rated on different scales using verbal anchors. Based on the German validation study of Glaesmer et al. (2018), who found a one-factorial construct for the German version of the SBQ-R, we ran our primary analyses on total scores and examined single item scores by means of post-hoc analyses. For the SBQ-R total score higher scores indicate more severe suicidal behavior. In the present study, the SQB-R showed acceptable internal consistency, with α = 0.79 and ω = 0.79.

5.3.3   Data Analyses

Analyses were conducted using R version 4.1.2 (R Core Team, 2022). Patterns of missing data (i.e., missing completely at random, missing at random, not missing at random) were examined using the *RBtest* package (Rouzinov & Berchtold, 2020). Missing data were handled by full information maximum likelihood (FIML) estimations for mediation models. Correlations were compared using the *cocor* package (Diedenhofen & Musch, 2015).

Mediation models. To analyze the relationships between CGNC, ACEs, SOC, and mental health problems, we employed simple and moderated mediation models using the *lavaan* package (Rosseel, 2012). All predictors were standardized prior to analysis, all analyses were controlled for

the association of age and education with mental health problems, and we report on standardized coefficients. We examined the association between CGNC and ACEs (*a*-path), the association between ACEs and mental health problems (i.e., depressive symptoms, loneliness, and suicidal behavior; *b*-paths), and the relationship between CGNC and symptoms of mental health problems (*c*-paths, i.e., direct effect). Indirect effects were examined as a product of the *a*- and *b*-paths, with a significant *a**b path coefficient being interpreted as evidence in favor of a mediation (Zhao et al., 2010). Moreover, we calculated the proportion mediated as effect size indicator for the mediation effect, that is, the proportion of the total effect accounted for by the indirect effect (Wen & Fan, 2015).

Moderated mediation models. Additionally, we examined SOC as moderator of the association between ACEs and symptoms of mental health problems. The importance of SOC as a moderator was examined using the index of moderated mediation, which quantified whether the mediation effect of ACEs on mental health problems was dependent on SOC levels. A significant moderated mediation can be assumed when the 95% confidence interval (CI) of the index of moderated mediation (*IMM*) does not include zero (Hayes, 2017). Following recommendations on the analysis of moderated mediations and to account for potential influences of the sample size (Preacher et al., 2007), we estimated direct, indirect, and total effects, standard errors, and 95% CIs based on 1,000 bias-corrected bootstrapped samples. As an indicator of effect sizes for the moderated mediation effect, we examined the indirect effect as well as the proportion mediated at different levels of the moderator (± 1 *SD* of SOC) and reported on the difference of the proportion mediated (i.e., Δ proportion mediated).

Sensitivity analyses. On an exploratory basis, the impact of sexual orientation (exclusive or predominantly heterosexual orientation vs. other sexual orientations) on mediation models was examined by means of multigroup analyses. First, we compared the simple mediation model constraining coefficients to be equal across participants with heterosexual and other sexual orientations using a χ^2 difference test according to the Satorra and Bentler (2001) method. Second,

we examined whether the moderator effect of SOC in the moderated mediation model differed between sexual orientations. For this purpose, we compared a model constraining the effect to be equal across sexual orientations with a model allowing the effect to vary between sexual orientations.

5.4   Results

5.4.1   Sample Characteristics

The mean age of respondents included in the analyses (n = 371) was 32.5 years (SD = 11.79; range: 18–69 years), and all respondents were cisgender men, which means they self-reported to have been born with male sexual characteristics and identified themselves as being men. Of those, 53.4% indicated to be exclusively or predominantly heterosexual, 36.7% reported to be exclusively or predominantly homosexual, 8.4% were bisexual, 1.3% indicated to be pansexual and 0.3% were asexual). Other sociodemographic characteristics are presented in Table 14. In total, 0.3% of the data included in our primary analyses was missing. The regression-based test (RBtest) showed that the missing data for all variables included in the following analyses were at least missing at random, allowing for the use of FIML for mediation models.

5.4.2   Comparison of Heterosexual Participants and Other Sexual Orientations

First, we examined whether the most relevant study variables varied between heterosexual participants and those reporting other sexual orientations (i.e., homosexual, bisexual, and other orientations). When we compared mean levels between both groups (see Table 14), heterosexual men reported lower levels of CGNC experiences and behaviors, t(310.93) = −11.76, p < .001, d = 1.33; fewer ACEs, t(313.9) = −2.88, p = .004, d = 0.33; and less severe suicidal behavior, t(338.73) = −2.26, p = .025, d = 0.25. For depressive symptoms, t(351.49) = −1.17, p = .243, d = 0.12; feelings of loneliness, t(356.06) = −1.61, p = .108, d = 0.17; and sense of coherence, t(358.97) = 0.80, p = .425, d = 0.08, we found no significant between-group differences.

Table 14. *Sociodemographic Characteristics of the Total and Subsamples*

	Total sample (n = 371)	Heterosexual participants (n = 198)	Other sexual orientations (n = 173)	Comparison heterosexual vs. other sexual orientations
Age [*M* (*SD*)]	32.47 (11.79)	32.75 (11.75)	32.16 (11.85)	$t(361.49) = 0.48$, $p = .634$, $d = 0.05$
Educational level [*n* (%)]				
No academic degree	2 (5.4)	2 (1.0)	0 (0)	$\chi(6) = 13.94$, $p = .030$
Lower secondary qualification	10 (2.7)	4 (2.0)	6 (3.5)	
Intermediate secondary qualification	32 (8.6)	10 (5.1)	22 (12.7)	
Vocational diploma	130 (35.0)	67 (33.8)	63 (36.4)	
(Applied) university diploma	175 (47.2)	107 (54.0)	68 (39.3)	
Doctoral degree	10 (2.7)	4 (2.0)	6 (3.5)	
Other degree	5 (1.3)	3 (1.5)	2 (1.2)	
Marital status [*n* (%)]				
Single, not in a relationship	166 (44.7)	75 (37.9)	91 (52.6)	$\chi(3) = 12.26$, $p = .007$
In a relationship, not married	117 (31.5)	63 (31.8)	54 (31.2)	
Married	73 (19.7)	50 (25.3)	23 (13.3)	
Divorced	15 (4.0)	10 (5.1)	5 (2.9)	
Childhood gender nonconformity [*M* (*SD*)]	20.84 (9.68)	16.05 (6.93)	26.32 (9.48)	$t(310.93) = -11.76$, $p < .001$, $d = 1.33$
Aversive childhood experiences [*M* (*SD*)]	39.28 (13.80)	37.33 (11.63)	41.50 (15.67)	$t(313.9) = -2.88$, $p = .004$, $d = 0.33$
Depressive symptoms [*M* (*SD*)]	8.94 (6.21)	8.58 (5.95)	9.34 (6.50)	$t(351.49) = -1.17$, $p = .243$, $d = 0.12$
Loneliness [*M* (*SD*)]	15.76 (4.02)	15.44 (3.91)	16.12 (4.13)	$t(356.06) = -1.61$, $p = .108$, $d = 0.17$
Suicidal behavior [*M* (*SD*)]	7.39 (3.62)	7.00 (3.30)	7.85 (3.91)	$t(338.73) = -2.26$, $p = .025$, $d = 0.25$
Sense of coherence [*M* (*SD*)]	41.87 (10.40)	42.27 (10.32)	41.40 (10.5)	$t(358.97) = 0.80$, $p = .425$, $d = 0.08$

Second, we compared the correlations between relevant study variables for heterosexual participants and those with other sexual orientations. We did not find evidence of a between-group difference for any of the correlations, even without applying a correction for multiple testing (see Table 2).

Table 15*. Correlations Between Study Variables for Heterosexual Individuals and LGB Individuals*

A. Pearson correlations	1.	2.	3.	4.	5.	6.
1. Childhood gender nonconformity (CGNC)	-	.29	.26	.29	.25	−.22
2. Aversive childhood experiences (ACEs)	.11	-	.49	.43	.51	−.43
3. Depressive symptoms	.32	.34	-	.51	.58	−.71
4. Loneliness	.17	.30	.62	-	.39	−.57
5. Suicidal behavior	.15	.41	.53	.39	-	−.57
6. Sense of coherence (SOC)	−.25	−.33	−.74	−.69	−.55	-
B. Between-group comparisons (*p*-values)						
1. Childhood gender nonconformity (CGNC)	-					
2. Aversive childhood experiences (ACEs)	.078	-				
3. Depressive symptoms	.518	.073	-			
4. Loneliness	.211	.148	.109	-		
5. Suicidal behavior	.292	.212	.491	.991	-	
6. Sense of coherence (SOC)	.801	.300	.459	.064	.782	-

Note. A. Pearson correlations (*r*) per subgroup, with correlations for heterosexual participants above the diagonal and those of participants with other sexual orientations below. B. Between-group comparisons of correlation coefficients with *p*-values of respective Fisher's *z* tests (no correction for multiple comparisons has been applied). Non-significant correlations point to no between-group differences between heterosexual men and men with other sexual orientations.

5.4.3   *Bivariate Relationships*

Figure 20 shows the bivariate relationships between all variables included in the present analyses for the total sample. As expected, CGNC showed small associations with ACEs, *r* = 0.22, *p* < .001; depressive symptoms, *r* = 0.28, *p* < .001; loneliness, *r* = 0.23, *p* < .001; suicidal behavior, *r* = 0.23, *p* < .001; and SOC, *r* = –0.22, *p* < .001. ACEs were associated with depressive symptoms, *r* = 0.42, *p* < .001; loneliness, *r* = 0.36, *p* < .001; suicidal behavior, *r* = 0.47, *p* < .001; and SOC, *r* = –0.38, *p* < .001, all showing medium-sized associations. Moreover, SOC showed a large negative association with depressive symptoms, *r* = –0.74, *p* < .001; loneliness, *r* = –0.64, *p* < .001; and suicidal behavior, *r* = –0.57, *p* < .001.

Figure 20. *Bivariate Pearson Correlations Between Study Variables*
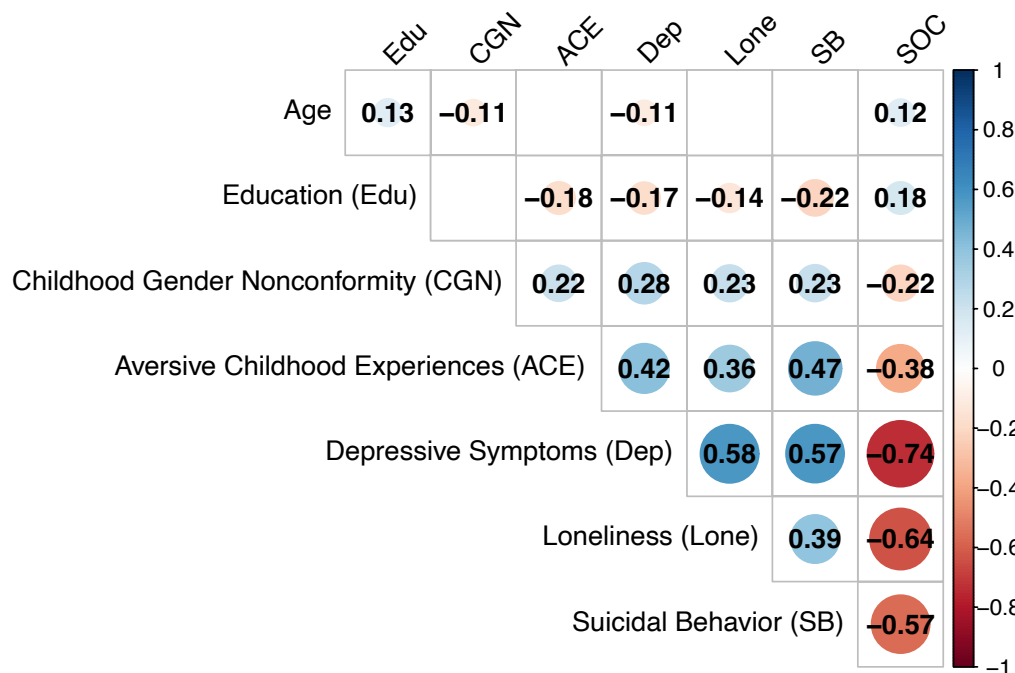
Note. Graphical illustration of bivariate Pearson correlations between all study variables, non-significant correlations are blank. All correlations presented in the figure were significant at p < .05. SOC = sense of coherence.

5.4.4 Depressive Symptoms

Simple mediation. CGNC significantly predicted[4] ACEs, $a = 0.22$, 95% CI [0.11, 0.33], $p < .001$, and ACEs were found to be significantly associated with depressive symptoms, $b = 0.36$, 95% CI [0.25, 0.48], $p < .001$, together reflected in a significant indirect effect, $a*b = 0.08$, $p = .001$, 95% CI [0.04, 0.13] (see Figure 21 for a graphical illustration). Moreover, there was a significant direct effect of CGNC on depressive symptoms, $c = 0.19$, 95% CI [0.09, 0.29], $p = .001$. Of the total effect, 30.2% were accounted for by the indirect effect. Older respondents reported lower levels of depressive symptoms, $g_1 = -0.10$, 95% CI [−0.20, −0.01], $p = .034$, and the link between higher educational levels and lower depressive symptoms was close to statistical significance, $g_2 = -0.09$, 95% CI [−0.18, 0.01], $p = .052$. Compared to a constrained model, allowing coefficients to vary between sexual orientations did not significantly improve model fit, $\Delta\chi^2(5) = 9.51$, $p = .090$.

Moderated mediation. In the model including SOC as moderator of the relationship between ACEs and depressive symptoms, the analysis also found a significant indirect effect, $a*b = 0.03$, 95% CI [0.00, 0.05], $p = .025$, and a direct effect, $c = 0.12$, 95% CI [0.05, 0.20], $p = .002$, with 17.5% of the total effect being mediated via ACEs (see Figure 22 for a graphical illustration). Moreover, a significant interaction term between SOC and ACEs, $b_3 = -0.11$, 95% CI [−0.18, −0.05], $p = .001$, and a significant index of moderated mediation, $IMM = -0.03$, 95% CI [−0.05, −0.01], $p = .015$, indicated that SOC had an impact on the relationship between ACEs and depressive symptoms. While the indirect effect at 1 *SD* below average SOC was significant, $a*b = 0.05$, 95% CI [0.02, 0.08], $p = .003$, proportion mediated: 29.5%; this effect was no longer present at 1 *SD* above average SOC, $a*b = 0.00$, $p = .950$, 95% CI [−0.03, 0.03]; proportion mediated: 0.7% (Δ proportion mediated: 28.8%). In this model, age and education were not significantly associated with depressive symptoms. For this

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[4] Within the Results section, the term "predicted" is used to describe the results of regression models and should not be misinterpreted as a causal relationship.

model, we did not find a significant difference for the moderator effect of SOC between heterosexual participants and those with other sexual orientations, $\Delta\chi^2(1) = 0.00$, $p = .992$.

Figure 21. *Simple and Moderated Moderation Models*
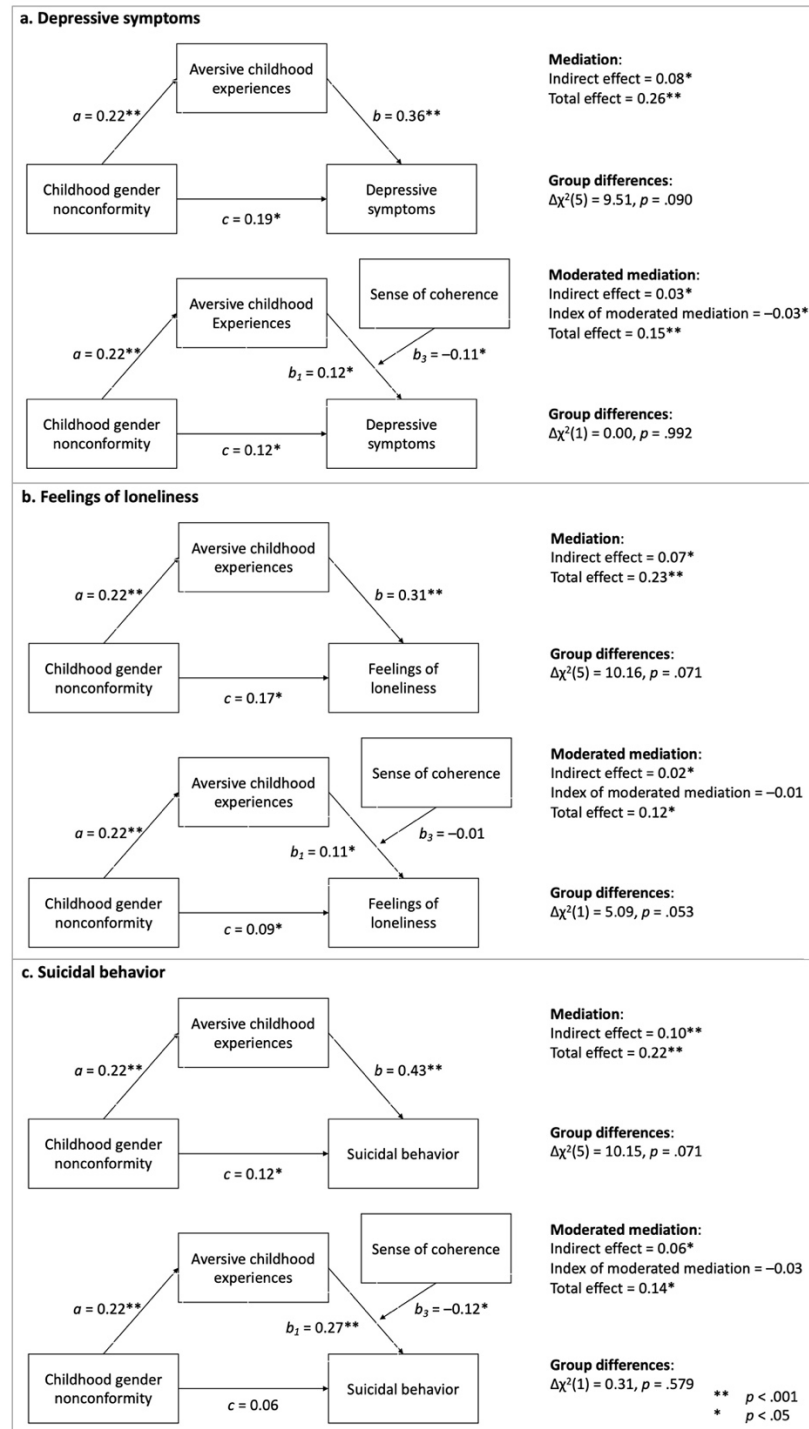
Note. Simple and moderated mediation models for depressive symptoms (a), feelings of loneliness (b), and suicidal behavior (c).

Figure 22. *Graphical Illustration of the Moderating Effect of Sense of Coherence*
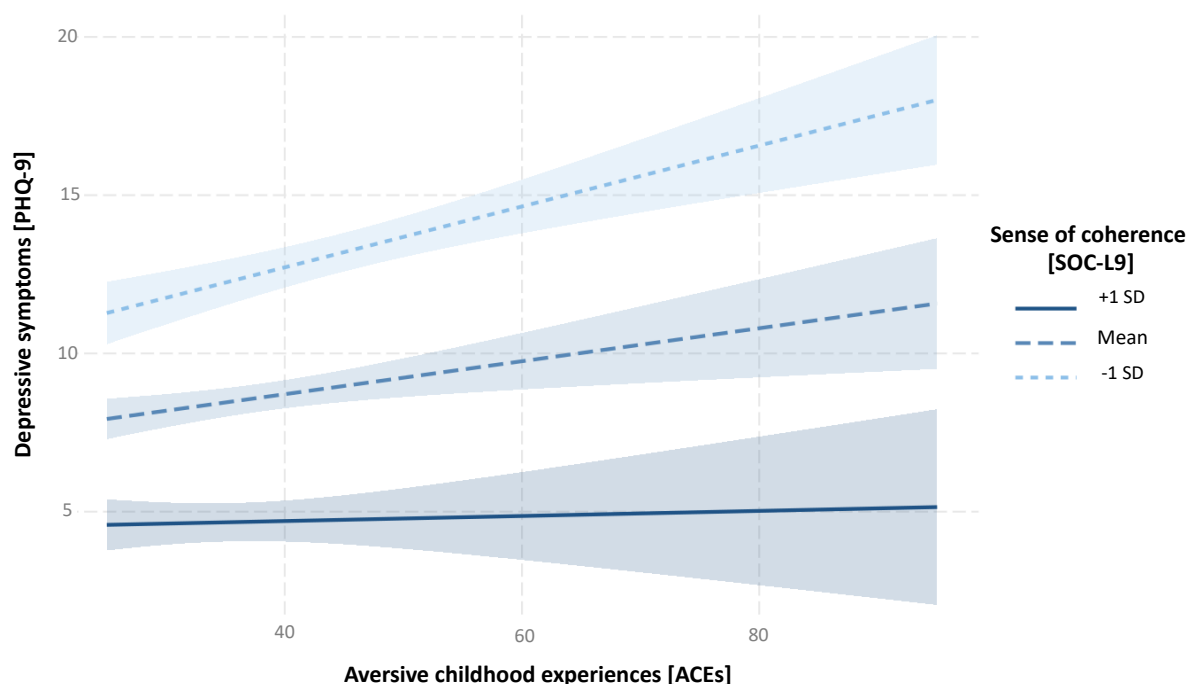
Note. Graphical illustration of the moderating effect of sense of coherence on the association between aversive childhood experiences and depressive symptoms.

5.4.5   Feelings of Loneliness

Simple mediation. The association between CGNC and ACEs remained unchanged, a = 0.22, 95% CI [0.12, 0.33], p < .001, and ACEs were significantly associated with loneliness, b = 0.31, 95% CI [0.20, 0.42], p = .001. The analysis found a significant indirect effect, $a*b$ = 0.07, 95% CI [0.03, 0.11], p = .001, and a direct effect of CGNC on loneliness, c = 0.17, 95% CI [0.07, 0.26], p = .001. Of the total effect, 29.2% were mediated via ACEs. Age and educational level had no significant association with loneliness in this model. Also for this model, allowing paths to differ between sexual orientations did not result in an improved model fit, $\Delta\chi^2(5)$ = 10.16, p = .071.

Moderated mediation. In the model including SOC as a moderator of the relationship between ACEs and loneliness, as for the simple mediation, a significant indirect effect was found, $a*b$ = 0.02, 95% CI [0.00, 0.05], p = .045, with 19.7% of the total effect being accounted for by the indirect effect. However, SOC did not moderate the relationship between ACEs and loneliness, *IMM* = –0.01,

95% CI [–0.02, 0.02], p = .780, b_3 = –0.01, 95% CI [–0.11, 0.08], p = .777. In this model, a higher age was significantly associated with more severe loneliness, g_1 = 0.12, 95% CI [0.04, 0.21], p = .005, while no significant relationship emerged between loneliness and education. Again, we found no significant impact of sexual orientation on the moderator effect of SOC, $\Delta\chi^2(1)$ = 5.09, p = .053.

5.4.6   Suicidal Behavior

Simple mediation. Besides the signification association between CGNC and ACEs, a = 0.22, 95% CI [0.12, 0.33], p < .001, a significant association emerged between ACEs and suicidal behavior, b = 0.43, 95% CI [0.33, 0.54], p < .001. The analysis found a significant indirect effect, $a*b$ = 0.10, 95% CI [0.04, 0.15], p < .001, along with a significant direct effect of CGNC on suicidal behavior, c = 0.12, 95% CI [0.03, 0.21], p = .013. Of the total effect, 44.4% were accounted for by the indirect effect. More severe suicidal behavior was associated with younger age, g_1 = –0.10, 95% CI [–0.22, –0.04], p = .025, and lower educational levels, g_2 = –0.13, 95% CI [–0.22, –0.04], p = .007. For this model, we did not find a significant impact of sexual orientation, $\Delta\chi^2(5)$ = 10.15, p = .071.

Moderated mediation. A model including SOC as a mediator of the relationship between ACEs and suicidal behavior revealed mixed results. In this model, the link between CGNC and suicidal behavior was fully mediated via ACEs, c = 0.06, 95% CI [–0.02, 0.17], p = .115; proportion mediated: 43.9%. While there was a significant interaction term between SOC and ACEs, b_3 = –0.12, 95% CI [–0.22, –0.03], p = .014, the *IMM* was only close to significance, *IMM* = –0.03, 95% CI [–0.05, 0.00], p = .058. The indirect effect at 1 *SD* below average SOC was significant, $a*b$ = 0.09, 95% CI [0.03, 0.14], p = .003, proportion mediated: 53.0%; while this effect was only close to significance at 1 *SD* above average SOC, $a*b$ = 0.03, 95% CI [–0.01, 0.07], p = .097; proportion mediated: 30.3% (Δ proportion mediated: 22.7%). Age was not significantly associated with suicidal behavior, while lower levels of education were associated with more severe suicidal behavior, g_2 = –0.09, 95% CI [–0.18, –0.01], p = .048. In this model, we did not find a significant impact of sexual orientation on the moderator effect of SOC, $\Delta\chi^2(1)$ = 0.31, p = .579.

Post-hoc analyses on suicidal behavior. We subsequently examined potential moderated mediations for different aspects of suicidal behavior (for details see Supplementary Material SM2.2– 2.5). SOC had no moderating effect on lifetime suicidal behavior, b_3 = 0.03, 95% CI [–0.11, 0.17], p = .661; *IMM* = 0.01, 95% CI [–0.03, 0.04], p = .657, or threat of suicidal behavior, b_3 = 0.02, 95% CI [– 0.11, 0.16], p = .716; *IMM* = 0.01, 95% CI [–0.02, 0.03], p = .725. However, SOC was a significant moderator of the association between ACEs and suicidal behavior in the last 12 months, b_3 = –0.24, 95% CI [–0.34, –0.15], p < .001; *IMM* = –0.05, 95% CI [–0.09, –0.02], p = .002. As for depressive symptoms, the indirect effect was significant at 1 *SD* below average SOC but was non-significant at 1 *SD* above average SOC; that is, for those with above average SOC, higher levels of ACEs were no longer associated with more suicidal behavior. For future suicidal behavior, we found no significant indirect effect of CGNC via ACEs on future suicidal behavior, $a*b$ = 0.02, 95% CI [–0.04, 0.05], p = .214, and thus no effect which could be buffered by SOC. For none of these models, including sexual orientation as grouping variable improved the model fit, p ≥ .130 (for details see Supplementary Material).

5.5   Discussion

In this study, we examined the relationships between childhood gender nonconformity (CGNC), aversive childhood experiences (ACEs), mental health problems, and sense of coherence (SOC) in cisgender men. In line with our hypothesis, we found positive associations between CGNC and depressive symptoms, feelings of loneliness, and suicidal behavior. Men with higher levels of CGNC also reported more ACEs and more severe mental health problems, and the relationship between CGNC and mental health problems was partly mediated via ACEs. For depressive symptoms and suicidal behavior in the last 12 months, we found evidence of a buffering effect of SOC on the relationship between ACEs and mental health problems. While in the case of low SOC levels, a significant positive association emerged between ACEs and mental health problems in the mediation model, this association was no longer present for participants with higher levels of SOC.

Our results regarding the link between CGNC and mental health problems in adulthood were mostly consistent with previous research; for example, Folkierska-Żukowska et al. (2022) found a similar positive association between CGNC and depressive symptoms for homo- and heterosexual men. Also, Roberts et al. (2013) found that individuals with higher CGNC show an increased likelihood of later depression. Furthermore, in a longitudinal study, Oginni et al. (2019) showed that CGNC prospectively predicted later depressive symptoms as well as suicidal behavior. We also expected a positive correlation between CGNC and loneliness, as it is known that persons with high levels of CGNC are more likely to report having been loners as children (Green, 1976). Additionally, Hart et al. (2019) found a positive association between teasing because of CGNC and loneliness in adulthood. Regarding suicidal behavior, the longitudinal study by Oginni et al. (2019) demonstrated that CGNC in infancy prospectively correlated with suicidal behavior in early adulthood. Also, Plöderl and Fartacek (2009) found a comparable significant association between CGNC and current suicidality among homosexual and bisexual individuals, but not for the heterosexual subsample. In contrast to their findings, we found - yet in a relatively small sample which may have been underpowered for multigroup modeling - no significant difference between homo- or bisexual men and heterosexual men in our sample. Thereby, our findings preliminary support another study that found a positive association between CGNC and suicidal behavior irrespective of individuals' sexual orientation (Ioerger et al., 2015). In contrast, some studies found no associations between (childhood) gender nonconformity and depressive symptoms (e.g., Cook et al., 2013; Sandfort et al., 2016; Timmins et al., 2018). So far, it is not clear which factors account for these between-study differences. Thus, future studies - ideally including international samples - need to examine cultural and methodological drivers of these heterogeneous findings.

In summary, the findings suggest that CGNC might be a risk factor for mental health problems, at least in Western high-income countries. In addition, previous studies suggest that this association is present not only for sexual minorities, but also for heterosexual individuals. This implies that the negative mental health consequences of CGNC might be a broader public health

issue, which is not limited to LGB individuals (Plöderl, 2016). Individuals with higher levels of CGNC seem to be at higher risk for ACEs and mental health problems in later life, regardless of their sexual orientation. Nevertheless, this particularly affects individuals on the LGB spectrum, as they report much higher levels of CGNC on average compared to heterosexual individuals (Bailey & Zucker, 1995; Jones et al., 2017; Li et al., 2017).

We then examined whether the ACEs statistically mediate the relationship between CGNC and mental health problems. Consistently across all outcomes, we found evidence of a mediating effect of ACEs on the relationship between CGNC and mental health problems. Higher CGNC was associated with more ACEs and, in turn, with higher levels of mental health problems, that is, more depressive symptoms and feelings of loneliness as well as more intense suicidal behavior. The proportion of the total effects being mediated via ACEs ranged between 29.2% (for feelings of loneliness) and 44.4% (for suicidal behavior). Thus, mediation effects were substantial in all models, yet varied in size and were particularly relevant for suicidal behavior, that is, the most devastating outcome. At the same time, across all models, the direct link of CGNC and mental health outcomes remained larger in size than the indirect path.

These mediator effects are in line with previous research, for instance, Zhao et al. (2021) found that gender nonconformity is associated with adulthood depressive symptoms, which was mediated by childhood victimization in a Chinese sample. Furthermore, Plöderl and Fartacek (2009) found a significant impact of CGNC via childhood maltreatment on suicidal behavior. D'Augelli et al. (2006) also found an association between CGNC, victimization, and subsequent mental health as measured by PTSD symptom severity in an LGB sample. Our findings thus fall in line with previous studies. It should be noted, however, that the direct pathway remains significant in all mediation models, suggesting that additional factors influence the association between CGNC and adult mental health problems. Such factors may be related to additional victimization experiences later in life as a consequence of CGNC, internalized gender stereotypes, or dysfunctional coping strategies (e.g., Thoma et al., 2021).

Finally, we examined the buffering effect of SOC on the link between ACEs and mental health problems in the mediation models. For depressive symptoms, we found evidence of a buffering effect of SOC, with higher levels of SOC being associated with a smaller association of ACEs with depressive symptoms. While we found no significant buffering effect of SOC for feelings of loneliness, our findings on suicidal behavior again pointed to a buffering effect of SOC; however, the moderated mediation index was only close to significance. For both models, differences in the proportion mediated were substantial with 28.8% (for depressive symptoms) and 22.7% (for suicidal behavior) showing that an increase in SOC was associated with a substantial decrease of the relevance of the indirect effect via ACEs. Moreover, post-hoc analyses on suicidal behavior provided further insights: While we found no buffering effect of SOC for lifetime suicidal behavior, we found evidence of a buffering effect for suicidal behavior in the past 12 months. This finding may at first sight be surprising, as SOC is conceptualized as a rather stable global orientation (Antonovsky, 1979, 1987), which should be equally important in terms of past, current, and future suicidal behavior. However, previous studies have found SOC levels to change even over shorter periods of time and to be affected by exposure to stressors (Schäfer et al., 2020; Schäfer, Sopp, et al., 2022; Volanen et al., 2007); thus, current SOC might be more important for current and future mental health than for lifetime suicidal behavior. One explanation for the buffering effect of SOC on the link between ACEs and mental health problems may lie in self-perceived adaptive coping capacities. These were found to be negatively associated with suicidal behavior and depressive symptoms (McLafferty et al., 2019; Ong & Thompson, 2019; Thompson et al., 2010), and SOC—especially its manageability component—can be viewed as a self-perceived coping capacity (Super et al., 2016). The meaningfulness component might be another reason for SOC's buffering effect; higher levels of meaningfulness are associated with a feeling of purpose in life, which could in turn protect against the negative mental health consequences of stressor exposure during childhood and adolescence (Edwards & Holden, 2001; Hartanto et al., 2020). While our analysis found no indirect link between CGNC and future suicidal behavior via ACEs—and, hence, no buffering effect of SOC—we found SOC

to show a relevant bivariate association with anticipated future suicidal behavior, $r = -.51$ (see Supplemental Material). If future prospective studies provide evidence for SOC's ability to buffer the potentially harmful effects of stressor exposure during childhood and adolescence, this will underline the importance of SOC as a psychosocial resilience factor (Kalisch et al., 2015; Schäfer, Kunzler, et al., 2022).

The buffering effect of SOC found in our study on two mental outcomes is in line with previous prospective studies on other stressors (Schäfer et al., 2020; Schäfer, Sopp, et al., 2022) and with cross-sectional findings on childhood trauma (van der Hal-van Raalte et al., 2008). However, while previous findings were limited to highly specific types of trauma and trauma-related outcomes (i.e., the Holocaust [van der Hal-van Raalte et al., 2008]; World War II [Fossion et al., 2014]), our findings transferred the buffering effect of SOC to more diverse stressors (i.e., ACEs associated with the experience of CGNC) and outcomes. Even though these were found cross-sectionally, they may point to the fact that, in people with CGNC who are at increased risk of ACEs, a stronger SOC could help ensure that the well-established negative mental health consequences of ACEs (Hamby et al., 2021) do not materialize.

If this notion is supported by future longitudinal research, SOC might be an important target of prevention measures for those with ACEs in this group. In this case, the theoretical inconsistency in which SOC is found to change even within shorter periods (Schäfer et al., 2020) may point to the potential of SOC-fostering interventions. In line with this possibility, SOC has been found to be positively affected by short-term rehabilitation measures or psychotherapy (Schäfer et al., 2020; Vossler, 2012) as well as resilience-fostering interventions (e.g.; Foureur et al., 2013).

However, to date, a strong evidence base for SOC-fostering interventions in different populations has been lacking, as the findings are partly limited by the rather nonspecific interventions (i.e., interventions not specifically targeting the SOC components, namely manageability, meaningfulness, and comprehensibility) or insufficient study designs (i.e., single-arm trials). A systematic review of SOC-fostering interventions has been pre-registered but is not yet

finished (Kotzur et al., 2022). The findings of this review may allow for the development of an

evidence-based SOC-fostering intervention that could be used in populations at high risk for mental

disorders, such as people with CGNC experiences and behaviors irrespective of their sexual

orientation. Moreover, the review on SOC-fostering interventions may also help to gain insights into

the important question of intervention timing. So far, it is unknown whether interventions may be

more effective when used as a primary or secondary prevention measure or non-indicated (mental)

health promotion intervention.

Having the potential benefits of SOC-fostering interventions in mind, our findings in line with

previous studies (e.g., Chan, 2022; Plöderl & Fartacek, 2009; Zhao et al., 2021), suggest that the

negative mental health consequences of CGNC may (partly) arise from negative social reactions,

which are likely not being limited to ACEs. Fostering SOC at individual level may have the potential to

buffer the negative mental health consequences for those who have already experienced negative

social reactions by a heteronormative environment. However, such interventions should not be

misunderstood as transfer of responsibility to individuals with CGNC experiences and behaviors. If

further supported by longitudinal research, the link between CGNC and ACEs also raises the

questions of what can be done on societal level to protect individuals from negative social reactions

to CGNC. The discussion of such interventions is beyond the scope of the current study, but of major

importance for intervening before individuals are exposed to ACEs, which in turn put them at a

lifelong risk for mental health problems.

5.5.1   *Limitations*

One possible limitation of our study relates to the data collection period, ranging from

February to August 2021. During that time, the COVID-19 pandemic was affecting the lives of many

people in Germany, which might have biased our results — especially for feelings of loneliness, which

were found to increase during the pandemic (Buecker & Horstmann, 2021; Ernst et al., 2022).

However, as we were not interested in mean-level comparisons, and associations with mental health

problems were comparable to previous studies (e.g., Folkierska-Żukowska et al., 2022; Hart et al., 2019; Plöderl & Fartacek, 2009), the pandemic may not have influenced our findings at large.

Our study may also be at risk for selection bias as we recruited a convenience sample. As the study was advertised for being related to men's health, we cannot exclude that particularly healthy or burdened individuals decided to participate in our study. Both may be plausible as, on the one hand, a study on health may be more salient for those who experience health issues, and on the other hand, those with severe health issues may be too sick to participate in our study. Findings on bivariate associations of CGNC and mental health problems were similar as found in representative cross-sectional samples (e.g., Alanko et al., 2009; Collier et al., 2013; Lowry et al., 2018), however, as our mediation models have not yet been tested in a representative sample, findings may be different in other samples.

However, the most important limitation of our study is its cross-sectional design, which prevents our conclusions from being causal. First, the data on CGNC and ACEs were collected retrospectively and could therefore be biased. Memories may be repressed, forgotten, or faded. For example, ACEs may not be recalled because they occurred in infancy or because they are not considered abusive experiences (Hardt & Rutter, 2004). In addition, it is reasonable to assume that the quality and accuracy of recall decreases with increasing temporal distance. Thus, it might be more difficult for older subjects to accurately recall memories from childhood. Nevertheless, existing evidence suggests that retrospective recording of objective life experiences, such as ACEs, have good reliability (Hardt & Rutter, 2004). Studies also suggest that affected individuals underestimate rather than overestimate the frequency of ACEs and that there is little critical influence of the current mood state (Hardt & Rutter, 2004; Spinhoven et al., 2010). However, it cannot be ruled out that subjects may make conscious or unconscious false responses, for example, due to social desirability or stereotypical assumptions about themselves. It has been discussed, for example, whether homosexual men stereotypically judge themselves to be more gender nonconforming. However, Plöderl & Fartacek (2009) concluded that evidence speaks against this assumption.

Moreover, we ran sensitivity analyses on the impact of sexual orientation on our models. However, our study was not prospectively designed to allow for these comparisons, which may thus be underpowered. Future studies using larger samples need to examine whether our model comparisons, which were for some models close to significance, may point to small but meaningful differences between sexual orientations.

In addition, we cannot make a statement about the preventive buffering effect of SOC because we had only one period of investigation and could not examine whether an earlier SOC would buffer the effect of later stressors. Moreover, in previous research, SOC itself was also found to decrease following negative life events (Volanen et al., 2007), and it is likely to be negatively impacted by ACEs (Fossion et al., 2014). To make more valid statements about the buffering effect of SOC in this context, future studies should employ longitudinal and, ideally, prospective designs. In this context, it would also be useful to investigate the development of CGNC experiences and behaviors along with SOC during childhood and adolescence. On the one hand, this may be a crucial phase of intervention to prevent the onset of mental disorders after ACEs (i.e., the earlier, the better; Asmussen et al., 2019); on the other hand, a developmental perspective on SOC and its potential buffering effect of major stressors might also provide important insights for the development and improvement of SOC interventions in adults. Prospective studies following a developmental approach may also help to examine the moderators of the effects found in our study, which may include aspects of timing, ACE types, or persons involved in childhood maltreatment and abuse (e.g., parents, peers). Moreover, future studies should also examine which SOC component accounts for the potential buffering effect and whether different components are important for specific stressors and mental health outcomes. In the current study, we used SOC-L9 (Singer & Brähler, 2007) to assess SOC, which did not allow us to examine the SOC components, namely comprehensibility, manageability, and meaningfulness (Antonovsky, 1987). However, knowing which component accounts for the buffering effect would be interesting not only from a theoretical perspective but

also from a practical one, as this component might be the most important target for future

interventions.

5.5.2   Conclusion

In summary, the results of this study on adult cisgender men support the positive association

between CGNC and ACEs, which may reflect a negative social reaction to gender nonconforming

behavior. Moreover, we found higher levels of CGNC to be associated with more severe depressive

symptoms, feelings of loneliness, and suicidal behavior in adults. Moreover, we found the link

between CGNC and mental health problems to be partially mediated by ACEs. In cases of depressive

symptoms and suicidal behavior during the last 12 months, we found the link between ACEs and

mental health problems to be moderated by SOC. For those with higher levels of SOC, a positive

association between ACEs and mental health problems was no longer found. In contrast, SOC does

not seem to have a protective buffering effect on feelings of loneliness, lifetime suicidal behavior, or

threat of suicidal behavior. Thus, our findings provide preliminary evidence for SOC as a promising

target for prevention measures and resilience training in people with CGNC experiences and

behaviors. However, future prospective studies must examine this buffering effect and its potential

use for prevention in greater detail.

6   General Discussion

The aim of this dissertation was to enhance the knowledge about the relationship between gender nonconformity (GNC) and mental health and to identity factors that mediate, moderate or have a protective effect on this association. Through a systematic review and meta-analysis, as well as two empirical studies, this research provides a comprehensive analysis of how GNC influences mental health outcomes and mechanisms underlying this association.

The first study revealed a significant but small correlation between GNC and mental distress, $M(r)$ = .09, 95% CI [.06, .12], which was observed across most symptom domains. However, no significant correlations were found for self-esteem, well-being, body image problems or rumination in the main analysis. Subsequent moderator analyses revealed that the direction and magnitude of the correlation for both mental distress and self-esteem depended on the operationalization of GNC, cultural factors and the composition of the sample in terms of ethnic identity. These findings highlight the significance of considering contextual and methodological aspects when interpreting research on the relationship between GNC and mental health.

The second study aimed to replicate the findings on the relationship between childhood gender nonconformity (CGNC), childhood maltreatment (CM) and mental health in a sample of German outpatient psychotherapy patients. As hypothesized, a significant association was found between higher levels of CGNC and higher psychological distress, r = −.43. This medium effect (Cohen, 1988) was numerically higher compared to non-clinical samples (Alanko et al., 2008; van Beusekom et al., 2018). The relationship was partially mediated by experiences of CM, highlighting the importance of addressing early-life adversity as a driving factor in the relationship between CGNC and psychological distress in clinical context.

Study 3 investigated the role of SOC as a potential protective factor in a sample of 371 cisgender men from the general population. A significant association was found between CGNC and mental distress in adulthood, particularly depressive symptoms, r = .28, suicidal behavior, r = .23, and feelings of loneliness, r = .23. As hypothesized, experiences of CM mediated these relationships

across all three models. In addition, SOC demonstrated a buffering effect for depressive symptoms and current suicidal behavior. Notably, when SOC was increased by one standard deviation, the correlation between CM and depressive symptoms became non-significant, indicating that SOC could buffer the negative effects of psychosocial stressors, such as CM, in gender-nonconforming individuals. These finding suggest that SOC might be a promising starting point for the development of interventions to mitigate the effects of GNC-related psychosocial stressors.

6.1   Findings On the Relationship Between Gender Nonconformity and Mental Health and the Factors That Moderate This Relationship

The findings of all three studies indicate a small to moderate association between GNC and various indicators of mental distress across different study types and samples.

While the studies 2 and 3 showed a small to medium association between higher levels of GNC and higher levels of psychological distress (Study 2) and more depressive symptoms, suicidality and feelings of loneliness (Study 3), the meta-analysis (Study 1) revealed a more complex pattern. While a significant correlation between GNC and mental distress was found in the main analysis, no significant association emerged between GNC and self-esteem, well-being, body image problems, and rumination in the main analysis. In addition, the subsequent moderator analyses indicated that the direction and magnitude of the correlations between GNC and mental distress as well as self-esteem are moderated by cultural, individual, and methodological factors.

The first major finding of Study 1 was the significant influence of the GNC measure type on its correlation with mental health outcomes. One approach to differentiate GNC measures is to categorize them into behavior-based, mixed, and personality-based GNC measures (Hu et al., 2023). The results indicated that behavior-based and mixed GNC measures were associated with poorer mental health, whereas the personality-based GNC measures tended to correlate with better mental health outcomes. These significant differences were found for both mental distress and self-esteem. One explanation for this discrepancy is that behavioral expressions of GNC are more visible, making individuals more vulnerable to prejudice and stigmatization (Green et al., 2018; Wylie et al., 2010).

However, this assumption is challenged by findings from a recent meta-analysis on the relationship between GNC and victimization experiences (Hu et al., 2023), which found no significant differences based on the GNC measure type—although there was a tendency for smaller associations for personality-based GNC measures. These differences may be attributable to variations in how personality-based measures of GNC were operationalized. Hu et al. (2023) used difference scores between femininity and masculinity scales, Study 1 operationalized personality-based GNC as a high expression on the other-gender, irrespective of the individuals's score on their own gender scale. This approach was chosen because only a limited number of primary studies reported difference scores, and the chosen operationalization aligns most closely with the conceptual defintion of GNC adopted in this thesis (for example, see also: Lowry et al., 2018; Thoma et al., 2021). In general, there was great heterogeneity in the operationalization of GNC in the primary studies, which may also reflect changes in understanding over time.

Overall, these findings underscore the need for future studies to examine whether different GNC measures capture distinct dimensions of GNC that may be differentially linked to mental health (e.g., Lehavot & Simoni, 2011). One possibility would be the approach of Liben and Bigler (2008), subdividing GNC into *behavioral*, *cognitive*, and *affective* domains. Likewise, a multicomponent approach as proposed by Egan and Perry (2001) or by Lehavot, King, and Simoni (2011) could be helpful in gaining a better understanding of the relationship between GNC and mental health as well as stigmatization.

Secondly, the meta-analysis (Study 1) supports the assumption that cultural factors significantly influence the magnitude of the correlation between GNC and mental health. The results indicate that the cultural dimensions of Hofstede et al. (2010), particularly the dimensions individualism, indulgence, and uncertainty avoidance, as well as nation-level gender equality could have a significant influence on the magnitude of the relationship. Stronger correlations were found, when gender norms were rigid, deviation from these norms were perceived as socially threatening, and when the society under study was characterized by low individualism. These results are in line

with the findings of Zentner and von Aufsess (2022), who demonstrated lower nation-level gender

equality was associated with stronger correlations between GNC and self-esteem in two international

studies. The authors interpreted these results to mean that the rigid gender norms may intensify

social penalties for GNC, leading to poorer self-esteem.

Thirdly, Study 1 identified the sample composition in terms of ethnic identities as a

significant moderator. Specifically, the magnitude of the correlation was weaker in samples with a

greater proportion of White or Caucasian subjects, while the correlation increased in samples with a

greater proportion of African American or Black participants. On the one hand, these results might

reflect subcultural differences in gender norms and variations in how deviations from those norms

are handled (Lehavot, King, & Simoni, 2011; Moore, 2006). On the other hand, it might indicate

heightened minority stressors among ethnic minorities, such as experiences of stigmatization and

discrimination based on ethnic identity (Ghavami et al., 2020). According to the intersectionality

theory (Holley et al., 2016), individuals belonging to multiple minority groups experience

compounded prejudice, stigmatization and discrimination, which may explain the heightened mental

distress among gender-nonconforming African American and Black participants.

On the other hand, the results of the meta-analytic study (Study 1) do not suggest the

assumption that gender or sexual orientation moderates the relationship between GNC and mental

health. Instead, the association between GNC and mental distress as well as self-esteem appears

consistent across all individuals, regardless of gender or sexual identity. These findings align with the

public health perspective (Plöderl, 2016), which argue that GNC-related stigmatization impacts

mental health broadly and is not limited to specific demographic groups. However, meta-analyses

examining the relationship between GNC and victimization suggest stronger correlations among men

compared to women (Hu et al., 2023; Thoma et al., 2021), which challenges this assumption.

While these findings provide critical insight into the moderators on the relationship between

GNC and mental health, further research is needed to systematically examine these and further

factors in multi-national samples.

6.2   The Mediating Role of Experiences of Childhood Maltreatment

The results of the Study 2 and 3 support the hypothesis that CM plays a significant role in the relationship between CGNC and mental health problems in adulthood. Both studies revealed a partial mediation, suggesting that CM contributed to explaining the relationship between CGNC and psychological distress, depressive symptoms, suicidal behavior and feelings of loneliness. These findings align with previous research emphasizing CM as key mechanism linking CGNC to mental health problems.

CGNC appears to function as a risk factor for CM, which, in turn, negatively affects mental health. In this context, experiences of CM can be conceptualized as a specific form of stigmatization, with long-lasting psychological, social, behavioral and neurological consequences (Baldwin et al., 2023; Hughes et al., 2017; Xiao et al., 2023). Research suggest that CM can be linked to impairments in social functioning (Pfaltz et al., 2022), including heightened rejection sensitivity (Gao et al., 2023), which is commonly observed in gender-nonconforming individuals (Feinstein et al., 2012). Additionally, CM can significantly alter somatic and neurological processes, leading to increased vulnerability to mental health problems (Scheuer et al., 2018).

Although the mediating role of CM is well-supported, the partial mediation found in both studies suggest that further psychosocial stressors may also play a significant role in explaining the relationship between CGNC and mental health. Additional sources of stigmatization in childhood and adulthood, including victimization experiences (Baams et al., 2013; Narita et al., 2024; Roberts et al., 2013), social rejection from parents, peers, and teachers (Chan, 2022; Narita et al., 2024), and experiences of discrimination (Antebi-Gruszka et al., 2022; Zhao et al., 2021), may contribute to the mental health of gender-nonconforming individuals.

Moreover, internal cognitive and emotional processing factors may also act as mediators (Hatzenbuehler, 2009; Meyer, 2003). These could include the internalization of societal norms and prejudices (Timmins et al., 2020), the expectation of stigmatization (Puckett et al., 2016; Timmins et al., 2020, van Beusekom et al., 2018), and identity concealment (Puckett et al., 2016). Puckett et al.

(2016) found that when various minority stressors were examined simultaneously, expectation of future stigmatization emerged as only significant pathway, even when direct experiences of stigmatization where included. These findings highlight the importance of examining subjective perception of stigmatization in addition to objective psychosocial stressors.

Future studies should systematically examine these mediating pathways in longitudinal and prospective studies as well as assess whether their influence varies depending on specific mental health outcomes, as suggested by Beltz et al. (2021).

6.3   Sense of Coherence as a Potential Protective Factor

The findings of Study 3 support the assumption that SOC could serve as a protective factor in reducing the psychological impact of previously experienced stigmatization. Specifically, it was demonstrated that the relationship between CM and depressive symptoms as well as current suicidal behavior is moderated by SOC, such that these associations weakened as SOC levels increased. Notably, an increase in SOC by one standard deviation was sufficient to become the association between CM and depressive symptoms statistically non-significant, suggesting a strong buffering effect.

These findings align with previous research demonstrating SOC's protective influence against various psychosocial stressors across different populations (e.g., Baron-Epel et al., 2017; Fan et al., 2024; Schäfer et al., 2020; Schäfer, Sopp et al, 2022; van der Hal-van Ralte et al., 2008). Given its moderating effect, SOC emerges as a promising foundation for individual-level interventions aimed at reducing the long-term psychological consequences of CM and other forms of stigmatization among gender-nonconforming individuals.

These findings suggest that strengthening SOC could be an effective strategy to help individuals cope with the lasting effects of stigmatization. This assumption is supported by studies examining the association between discrimination based on other identity characteristics, such as ethnic background, and physical or mental health outcomes (Baron-Epel et al., 2017; Fan et al., 2024;

Noronha et al., 2023). These studies consistently found that SOC had a protective effect, particularly for minority groups (Baron-Epel et al., 2017).

Prior research has shown that individuals with higher SOC are more likely to reframe stressful experiences, exhibit better emotional regulation, and demonstrate greater psychological resilience in the face of adversity (Eriksson, 2022, Schäfer et al., 2020; van der Hal-van Ralte et al., 2008).

While these findings highlight SOC's potential role for intervention development, further research is required to determine how such interventions can effectively enhance SOC in gender-nonconforming individuals. In particular, it remains to be explored which components of SOC are most critical to its buffering effect and how these can specifically targeted and strengthened through intervention.

6.4   Limitations

This dissertation demonstrated small to moderate associations between GNC and mental distress across different samples and methods. The direction and magnitude of the correlations were affected by cultural, individual, and methodological factors. Moreover, the findings showed that CM is a key factor for poorer mental health and that SOC might be a protective factor in this relationship. However, several important limitations must be considered when evaluating these results.

One primary limitation of study 2 and 3 is their cross-sectional design, and the usage of retrospective measures, which limits the ability to establish causal relationships. However, several longitudinal studies support the role of stigmatization as a significant factor influencing mental health outcomes in gender-nonconforming individuals (e.g., Mahfouda et al., 2023; Narita et al., 2024; Roberts et al., 2012b; Roberts et al., 2013; Warren et al., 2022). Additionally, the possibility of unmeasured confounding variables influencing both GNC, CM, and mental health cannot be ruled out. For example, a lower socioeconomic status is associated with both higher risk of CM (Stith et al., 2009) and poorer mental health outcomes (Lorant et al., 2007), and its potential impact was not explicitly accounted for in this study.

Also, the generalizability of the findings are limited due to sample characteristic. The patient sample in study 2 represents an above-average burdened group that may report more CM and greater psychological distress (Struck et al., 2020), restricting the transferability of the findings to general population . Study 3 focused exclusively on cisgender men, limiting the applicability of the results to individuals of other genders.

Additionally, self-selection bias may have influenced the study sample (Bethlehem, 2010). It is possible that individuals with particular interest in mental health, gender identity, or sexual orientation were more likely to participate. While efforts were made to mitigate this issue by using neutral advertising, complete elimination of self-selection effects cannot be ensured.

A few other methodological limitations should be considered when interpreting the results. First, the interpretation of GNC measures may be influenced by cultural and social factors (Holt & Ellis, 1998; Zhang et al., 2001). Variations in the perception of gender norms across different societies could affect participant's self-assessment. Second, the reliance of retrospective self-report measures used in Study 2 and 3 may be impacted by social desirability bias (Krumpal, 2013) or recall biases (Hardt & Rutter, 2004). Individuals with poorer mental health may be more likely to recall CM more intensely (Hardt & Rutter, 2004), while others may minimize experiences of abuse (MacDonald et al., 2016) or underreport their GNC due to felt social pressure to conform to gender norms.

Study 1 indicated that cultural and individual factors could significantly influence the relationship between GNC and mental health. Consequently, the findings of this dissertation may not be generalizable to other cultural contexts. Changes in gender norms and societal attitudes towards GNC over time could also affect the reproducibility of these findings in future research (Holt & Ellis, 1998; Zhang et al., 2001). Also, the cultural factors used in Study 1 are a limiting factor. In particular, Hofstede's cultural dimensions have been criticised for oversimplifying cultural differences. For example, micro-cultural differences within a country are not taken into account (Signorini et al., 2009), culture is seen as static (McSweeney, 2002) and replicability is limited (Gerlach & Eriksson, 2012). Our findings should therefore be seen as a first step in the exploration of cultural differences.

Future studies should explore whether the results hold in different cultural and temporal contexts as well as consider further cultural factors, for example liberalism or religiosity, and ideally assess them empirically.

This dissertation focused primarily on CM as mediator but did not incorporate other potentially relevant psychosocial factors. Additional minority stressors, such as further forms of stigmatization, anticipated stigmatization, internalized gender norms or heterosexism and the felt pressure to conform to gender norms, may also play a role in shaping the relationship between GNC and mental health (Meyer, 2003; Puckett et al., 2016; Reidy, Kernsmith et al., 2018; Reidy, Smith-Darden et al., 2018). Future research should explore additional mechanisms that may impact the observed associations.

The meta-analysis only included studies that reported zero-order correlations, excluding research that reported other effect sizes or used alternative statistical methods such as ANOVA (e.g., Gordon et al., 2018; Roberts et al., 2013). This restriction may have limited the comprehensiveness of the findings. While various statistical techniques were applied to assess and control for publication bias, it cannot be entirely ruled out (Harrer et al., 2021). Although no significant indicators for publication bias were found in the multi-level meta-analysis, there were indications of publication bias for single mental health outcomes, which may have influenced the overall effect sizes. Attempts were made to address this shortcoming by reviewing grey literature and contacting authors for unpublished data. Also, the diversity in methodologies, sample characteristics, and measurement tools across primary studies included in the meta-analysis posed challenges in synthesizing findings. This heterogeneity may explain variation in reported effect sizes and complicated direct comparison between studies. To address this shortcoming, we tried to control for as many of these factors as possible in the moderator analyses. However, it was not possible to verify the influence of all possible aspects, either because there were too few studies available for a quantitative evaluation, or because the studies lacked information on these moderators.

While this dissertation provides valuable insights into the relationship between GNC and mental health, methodological, sample-related, and contextual limitations must be acknowledged. Future studies should address these limitations by incorporating longitudinal study designs, exploring additional mediators and moderators, and ensuring greater sample diversity. Furthermore, research efforts should aim to refine measurement tools to minimize cultural bias and recall errors, ultimately enhance the reliability of findings in this field.

6.5   Future Research

Based on the findings of this dissertation, several directions for future research can be identified. One key finding of the meta-analytic study (Study 1) was that the type of GNC measurement used had a substantial impact on the direction and strength of the observed relationship. Therefore, future research should focus on systematically examining how different operationalizations and conceptualizations of GNC influence its associations with stigmatization experiences and mental health outcomes.

Additionally, the results indicate that cultural and individual factors may have influenced findings in previous primary studies. To gain a more comprehensive understanding of these influences, multi-national studies examing moderating factors should be conducted across diverse cultural settings. In particular, research should prioritize low- and middle-income countries, where studies on GNC and mental health are currently scarce. Expanding research to these regions would allow for a more globally representative perspective on the relationship between GNC, stigmatization, and mental health.

In the clinical sample (Study 2), findings demonstrated that results observed in general population and convenience samples could be replicated in a clinical context. This suggests that GNC may serve as an indicator of increased exposure to psychosocial stressors, such as childhood abuse. However, to confirm the clinical relevance of these findings, replication in various clinical settings is necessary. Studies with larger and more diverse samples—including comparisons between clinical and non-clinical groups—is recommended to further validate these findings.

In Study 3, findings suggested that SOC may have a protective role in the mediation model linking GNC, CM, and mental health outcomes. However, these findings were based on a cisgender men sample, limiting their generalizability. Future research should investigate whether the protective effect of SOC extends to cisgender women samples and individuals of other gender identities, and whether the magnitude of this effect varies across different populations. Additionally, research should assess whether SOC also buffers against other forms of stigmatization among gender-nonconforming individuals, such as GNC-related discrimination. Furthermore, it is crucial to determine which specific component of SOC (comprehensibility, manageability, or meaningfulness) drives its protective effect, as this could inform targeted and efficient interventions.

Beyond individual-level interventions, broader societal interventions should also be explored. Future studies should examine strategies to reduce prejudice against GNC and mitigate associated stigmatization experiences. Understanding the mechanisms by which prejudice reduction influences mental health outcomes could help develop effective preventive interventions aimed at reducing mental distress linked to GNC-related stigma.

Finally, there is a pressing need for prospective and longitudinal studies that track GNC, experiences of stigmatization, and mental health trajectories over extended periods. Establishing causal relationships through longitudinal research would significantly strengthen the evidence base. Ideally, such studies should be conducted across multiple cultural contexts to assess contextual influences on these relationships. However, it is essential to guarantee the safety for participants, as tolerance levels for GNC may vary across different countries, potentially increasing the risk of stigmatization, imprisonment or threat to live of participants in certain regions.

In summary, advancing research on GNC, mental health, and protective factors requires a multi-faceted approach that includes methodological refinement, cross-cultural validation, clinical replication, intervention development, and longitudinal research designs. Addressing these gaps will contribute to a more comprehensive understanding of GNC-related mental health challenges and inform effective prevention and intervention strategies.

6.6   Conclusion

The aim of this dissertation was to gain deeper insight into the relationship between GNC and mental health, as well as the factors influencing this association.

A primary objective was to provide a comprehensive overview of existing research on the relationship between GNC and mental health to improve estimations of the direction and magnitude of this relationship and to identify potential moderating factors. To address this, a systematic review and meta-analysis (Study 1) was conducted, which revealed a small but significant association between GNC and mental distress. The findings suggested that the direction of the relationship depended on the type of GNC measure used for mental distress and self-esteem—with behavior-based GNC measures being associated with poorer mental health, while personality-based GNC measures tended to correlate with better mental health. Furthermore, the magnitude of the correlation was influenced by cultural and individual factors, underscoring the need for more context-sensitive approaches in future research.

Additionally, this dissertation supports the assumption that GNC may serve as an indicator of exposure to CM and subsequent psychological distress in clinical populations (Study 2). The observed association was not limited to specific subgroups, such as sexual minorities, but was also replicated in general population samples (Study 3) and patient samples (Study 2). These findings suggest that GNC-related psychosocial stressors extend beyond minority identities, making this an important area for broader mental health research and intervention development.

A further key contribution of this dissertation was the preliminary evidence suggesting that SOC may act as a protective factor against the negative consequences of psychosocial stressors such as CM (Study 3). However, further research is necessary to validate these findings in more diverse populations and to identify which specific SOC components exert the strongest protective effects. If replicated, these insights could inform the development and evaluation of SOC-based interventions aimed at improving resilience in gender-nonconforming individuals.

Overall, the findings of this dissertation suggest that the relationship between GNC and mental health is complex and multifaceted. Future research should focus on two key areas. First, the conceptual clarification of GNC: There is a need for a more standardized and nuanced understanding of GNC to enhance measurement reliability and comparability across studies. Second, longitudinal and prospective studies are required to establish causal relationships and to determine the long-term impact of GNC-related stressors and protective factors.

Finally, this dissertation highlights the importance of SOC as a potential protective factor in buffering the adverse effects of GNC-related stigmatization. However, further studies are needed to confirm the protective role of SOC and to explore its application in treatment and prevention strategies. Additionally, while individual-level interventions are crucial, broader societal interventions are necessary to reduce prejudice and stigmatization against gender-nonconforming individuals. Addressing structural and cultural barriers will be essential in fostering a more inclusive environment that supports the mental well-being of gender-nonconforming individuals.

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Appendices

Appendix A – Supplementary Material to Study 1

For Study 1, supplementary materials are provided in two OSF repositories. The first contains the original dataset submitted with the initial manuscript and corresponds to the published preprint. The second repository, a anonymized version, was created for the peer review process, includes anonymized and updated data corresponding to the revised version of the manuscript presented in this thesis.

Original OSF repository:

Issler, T. C., Schäfer, S., & Michael, T. (2025, March 23). The association between gender nonconformity and mental health – Protocol for a systematic review and meta-analysis. https://doi.org/10.17605/OSF.IO/P9ZRJ

Anonymized version of the OSF repository for peer review:

Issler, T. C., Schäfer, S., & Michael, T. (2024, September 5). The association between gender nonconformity and mental health – Protocol for a systematic review and meta-analysis (duplicate for peer review). Retrieved from osf.io/bsfq2

Appendix B – Supplementary Material to Study 2

SM-1. Changes in the German Translation of the Recalled Childhood Gender Identity/Gender Role

Questionnaire

Following a short pilot phase, we decided to adapt several items of the *Recalled Childhood*

Gender Identity/Gender Role Questionnaire (Zucker et al., 2006). The original German translation,

developed for use in Austria (Plöderl et al., 2007), included region-specific terminology. To better

reflect linguistic conventions commonly used in Germany, minor modifications were made.

Specifically, the terms *"Bub/Buben"* were replaced with the equivalents *"Junge/Jungen"*, both

meaning "boys." For example, we changed item 4 "Als Kind war ich im Vergleich zu anderen Buben."

to "Als Kind war ich im Vergleich zu anderen Jungen." These changes affect the items: 1, 2, 4, 6, 7, 8,

9, 11, 18, 19.

SM-2. Findings from the Mediation Analysis for Emotional Abuse

Table SM2-1.

Results of the mediation analysis for the influence of emotional abuse on the relationship between childhood gender nonconformity and adult psychological distress

Effect	Results
a-path	a = –0.45, 95% CI [–0.64; –0.25], $p<.001$
b-path	b = 0.17, 95% CI [0.04; 0.34], $p=.022$
c-path (direct effect)	c = –0.19, 95% CI [–0.35; –0.05], $p=.008$
Indirect effect	a*b = –0.08, 95% CI [–0.18; –0.02], $p=.057$
Total effect	total = –0.27, 95% CI [–0.42; –0.13], $p<.001$
Proportion mediated	prop = 29%
Covariate: age	g1 = –0.02, 95% CI [–0.18; 0.12], $p=.772$
Covariate: education	g2 = –0.13, 95% CI [–0.28; –0.004], $p=.060$

Notes. CI = Confidence interval; p = significance level.

SM-3. Findings from the Mediation Analysis for Neglect

Table SM2-2.

Results of the mediation analysis for the influence of neglect on the relationship between childhood gender nonconformity and adult psychological distress

Effect	Results
a-path	a = –0.28, 95% CI [–0.56; –0.03], p=.033
b-path	b = 0.24, 95% CI [0.09; 0.38], p=.001
c-path (direct effect)	c = –0.21, 95% CI [–0.34; –0.08], p=.001
Indirect effect	a*b = –0.07, 95% CI [–0.20; –0.01], p=.133
Total effect	total = –0.28, 95% CI [–0.42; –0.14], p<.001
Proportion mediated	prop = 24%
Covariate: age	g1 = –0.03, 95% CI [–0.18; 0.12], p=.115
Covariate: education	g2 = –0.10, 95% CI [–0.24; 0.03], p=.028

Notes. CI = Confidence interval; p = significance level.

SM-4. Findings from the Mediation Analysis for Physical Abuse

Table SM2-3.

Results of the mediation analysis for the influence of physical abuse on the relationship between childhood gender nonconformity and adult psychological distress

Effect	Results
a-path	a = –0.21, 95% CI [–0.41; 0.01], p=.048
b-path	b = 0.24, 95% CI [0.12; 0.37], p<.001
c-path (direct effect)	c = –0.22, 95% CI [–0.36; –0.11], p=.001
Indirect effect	$a*b$ = –0.05, 95% CI [–0.13; –0.01], p=.107
Total effect	total = –0.27, 95% CI [–0.42; –0.14], p<.001
Proportion mediated	prop = 19%
Covariate: age	g_1 = –0.07, 95% CI [–0.22; 0.98], p=.410
Covariate: education	g_2 = –0.13, 95% CI [–0.28; –0.01], p=.063

Notes. CI = Confidence interval; p = significance level.

SM-5. Findings from the Mediation Analysis for Sexual Abuse

Table SM2-4.

Results of the mediation analysis for the influence of sexual abuse on the relationship between childhood gender nonconformity and adult psychological distress

Effect	Results
a-path	a = –0.45, 95% CI [–0.67; –0.26], p<.001
b-path	b = 0.17, 95% CI [0.04; 0.32], p=.020
c-path (direct effect)	c = –0.19, 95% CI [–0.34; –0.04], p=.010
Indirect effect	a*b = –0.08, 95% CI [–0.18; –0.02], p=.061
Total effect	total = –0.27, 95% CI [–0.41; –0.12], p<.001
Proportion mediated	prop = 29%
Covariate: age	g1 = –0.02, 95% CI [–0.19; 0.13], p=.784
Covariate: education	g2 = –0.13, 95% CI [–0.27; 0.01], p=.065

Notes. CI = Confidence interval; p = significance level.

Appendix C – Supplementary Material to Study 3

Supplementary materials related to Study 3 can be accessed via the official article publication. The corresponding reference is listed below.

Issler, T. C., Ferreira de Sá, D., Michael, T., & Schäfer, S. K. (2023). The relationship between childhood gender nonconformity, aversive childhood experiences, and mental health in heterosexual and non-heterosexual cisgender men: The buffering effect of sense of coherence. *Stress and Health*, *39*(4), 782-797. https://doi.org/10.1002/smi.3227

Appendix D – Information on the Use of Additional Tools

Documentation on the use of artificial intelligence (AI) in this dissertation.

AI-based tool	Type of use	Affected parts of the dissertation
DeepL Translator (DeepL SE, Cologne, Germany; https://www.deepl.com/de/translator)	Translation of text passages	Entire dissertation
DeepL Write (DeepL SE, Cologne, Germany; https://www.deepl.com/de/write)	Support in wording/grammar	Entire dissertation
ChatGPT 4o (OpenAI, San Francisco, USA; https://www.openai.com/chatgpt/)	Support in language editing and general content structure	Chapter 1, Chapter 2, Chapter 6,
	Support in idea generation by generating content key points and questions to explore the subject matter in more depth	Chapter 1, Chapter 2, Chapter 6

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