‚Erfolgreich' bis ins hohe Alter?

Kritische Konzeptualisierung des erfolgreichen Alterns
und zentrale Determinanten für die Hochaltrigkeit

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Zusammenfassung

Die Anzahl hochaltriger Individuen wird zukünftig rapide steigen. Bisherige Konzepte des ‚erfolgreichen Alterns' (EA) wurden jedoch in erster Linie für Individuen jüngerer Altersegmente entwickelt und überprüft. ‚Klassisch' wird EA nach Rowe und Kahn (1997) als die Abwesenheit chronischer Erkrankungen bei gleichzeitiger Aufrechterhaltung kognitiver und körperlicher Funktionen sowie der Gestaltung eines aktiven Lebensstils definiert. Dieses Konzept des EA's wurde vielfach rezipiert aber auch kritisiert, sodass in dieser Dissertation erörtert wird, inwieweit es auf die Hochaltrigkeit übertragbar ist. Die übergreifende empirisch zu überprüfende Fragestellung der Dissertation lautet, welche (individuellen) Bedingungen notwendig sind, um im hohen Alter erfolgreich altern zu können. Als Folge davon werden die Kriterien des klassischen Konzepts des EA's zugunsten von Kriterien abgelöst, die adäquater auf die individuellen Merkmale und Ressourcen der Hochaltrigen angewendet werden können. Diese Kriterien sind im Konzept der ‚gelingenden (aktiven) Lebensführung' (GAL) nach Wagner et al. (2018b) enthalten.

Das einleitende Kapitel eins umfasst den konzeptionellen Hintergrund. Zunächst wird das klassische Konzept des EA's im Detail beschrieben: sein Ursprung, seine Kritik und seine Entwicklung. Der darauffolgende Abschnitt konzentriert sich auf die Merkmale der Hochaltrigkeit, auf die funktional äquivalenten Indikatoren des EA's und erörtert konzeptionelle Anpassungen an diese Altersgruppe. Dies führt zu einer Übernahme der GAL.

In den Kapiteln zwei bis vier werden anhand von eigenen Studien drei spezifische Forschungsschwerpunkte untersucht: (1) die empirische Bestandsaufnahme erfolgreich Alternder im hohen Alter anhand objektiver und subjektiver Kriterien sowie möglicher Determinanten, (2) die längsschnittliche Entwicklung dieser Kriterien sowie ihr Zusammenhang mit veränderten Lebenssituationen wie der Verwitwung oder dem Umzug in eine Institution, und (3) die Rolle von Bildungsungleichheiten für das Konzept der GAL, das die bevorzugten Kriterien des EA's für Hochaltrige beinhaltet und zum ersten Mal empirisch überprüft wird.

Gemäß den durchgeführten empirischen Analysen der NRW80+-Daten altern nur 9 % der Hochaltrigen in NRW objektiv erfolgreich und ein Drittel erfüllt vier von fünf der Rowe und Kahn Kriterien. Eine hohe Diskrepanz zwischen objektiven und subjektiven Kriterien zeigt sich aufgrund hoher subjektiver Werte in der Lebenszufriedenheit, im positiven Alternserleben, im affektiven Wohlbefinden und in der aktiven Verbundenheit mit dem Leben. Signifikante Prädiktoren sind ein jüngeres Alter und ein höherer Bildungsgrad. Weitere empirische längsschnittliche Analysen zur Hochaltrigkeit zeigen, dass die Ausprägungen der objektiven Kriterien des EA's über zwei Befragungswellen der NRW80+-Studie konstant bleiben. Wäh-

rend sich für Hochaltrige der subjektiv gemessene Erfolg des Alterns auf der Individualebene über die Zeit häufig verändert, bleibt dieser im Aggregat konstant. Interpersonales soziales Engagement, Lebenszufriedenheit und die aktive Verbundenheit mit dem Leben nehmen mit der Verwitwung signifikant ab. Dagegen nimmt interpersonales soziales Engagement mit dem Umzug in eine Institution signifikant zu. Was das geeignetere Konzept der GAL betrifft, so zeigt die Strukturgleichungsmodellierung der NRW80+-Daten, dass die Korrelation zwischen Bildung und der GAL signifikant durch Ressourcen wie Wohlstand, Gesundheitskompetenz und internales Kontrollerleben mediiert werden kann. Bildung bleibt allerdings für die GaL ein stärkerer Prädiktor als die anderen untersuchten Ressourcen.

Im abschließenden Kapitel fünf folgen die übergreifende Interpretation der drei Teilstudien, sowie deren Limitationen und Implikationen für die Wissenschaft und Praxis.

Abstract

The population of the oldest old will increase rapidly in the future. However, previous concepts of 'successful ageing' (SA) have been primarily developed and analysed for people in younger age segments. According to Rowe and Kahn (1997), SA is classically defined as the absence of chronic diseases while maintaining cognitive and physical functions and an active lifestyle. This classical model of SA has attracted much criticism, and this dissertation discusses to what extent it is transferable to the oldest old. The overarching question to be empirically examined is which (individual) conditions are necessary to enable successful ageing for the oldest old. As a result, the criteria of the classical concept of SA are abandoned in favour of criteria, which seem more applicable to the individual characteristics and resources of the oldest old. These are taken from the concept of 'successful life conduct' (SLC) by Wagner et al (2018b).

The introductory chapter one provides the conceptual background. First, the classical concept of SA is described in detail: its origin, criticism, and evolution. The subsequent section then focusses on the oldest old, setting up functionally equivalent indicators of SA and discussing conceptual adaptions for this group. This results in a shift of concept to SLC.

In chapters two to four, three specific research foci are investigated in individual studies: (1) the empirical analysis of SA in the oldest old based on objective and subjective criteria, as well as possible determinants, (2) the longitudinal development of these criteria as well as critical transitions such as widowhood or moving into an institution, (3) the role of educational inequalities for SLC, which entails the preferred set of SA criteria for the oldest old and which is empirically tested for the first time.

According to empirical analyses based on the NRW80+ data, only 9 % of the oldest old in NRW age successfully regarding objective Rowe and Kahn criteria, with one third fulfilling four out of five criteria. A high discrepancy between objective and subjective criteria arises due to high subjective values in life satisfaction, positive ageing experience, affective well-being, and the valuation of life. Significant predictors are a younger age and a higher level of education. Further empirical longitudinal analyses of the oldest old show that the values of objective criteria of SA remain constant over two survey waves of the NRW80+ study. While the subjectively measured success of ageing at the individual level frequently changes over time for the oldest old, it remained constant in the aggregate. Interpersonal social engagement, life satisfaction and valuation of life decrease significantly with widowhood and interpersonal social engagement increase significantly with moving into an institution. Turning towards the preferred concept of SLC, structural equation modelling of the NRW80+ data shows that the correlation between education and SLC can be significantly mediated by resources such as wealth, health literacy and internal control belief. However, education remains a stronger predictor of SLC than the other resources.

Finally, the concluding chapter five provides a comprehensive interpretation of the three studies, as well as their limitations and implications for science and practice.

1 Einleitung[1]

Hochaltrige sind in demographisch fortgeschrittenen Gesellschaften die am schnellsten wachsende Altersgruppe (Jopp et al. 2008; Motel-Klingebiel et al. 2013). In Europa wird sich ihr Bevölkerungsanteil bis 2070 verdoppeln (Eurostat 2019). In Deutschland wird 2060 etwa jeder achte Mensch 80 Jahre oder älter sein (Statistisches Bundesamt 2019). Der rasante Anstieg der Gruppe der Hochaltrigen in Deutschland und weltweit stellt eine gesellschaftliche Herausforderung dar, denn diese Gruppe kennzeichnet sich unter anderem durch gewisse gesundheitliche Einschränkungen, Pflegebedürftigkeit und damit einhergehender Abhängigkeiten bei Aktivitäten des täglichen Lebens. Diese Entwicklung hat gravierende Auswirkungen auf das Gesundheitssystem, insbesondere auf das Sozialsystem, das Rentensystem, das Mikrosystem Familie und im Hinblick auf Generativität. Neben einer breiten Diskussion über *Altersbilder* und deren historischen Wandel (Ehmer 2019) stehen unterschiedliche *Leitbilder des Alterns* im Mittelpunkt öffentlicher und wissenschaftlicher Diskurse. Eine besonders prominente Rolle spielt hier das von Rowe und Kahn (1997) vorgeschlagene Konzept des *„erfolgreichen Alterns",* für das – in vergleichbaren Operationalisierungen – inzwischen umfangreiche empirisch-quantitative Studienergebnisse aus den USA (z.B. McLaughlin et al. 2010), Europa (z.B. Hank 2011) und Asien (z.B. Nakagawa et al. 2020) vorliegen. Die Befunde dieser Untersuchungen weisen neben ‚universellen' sozialstrukturellen Mustern erfolgreichen Alterns, wie beispielsweise einem deutlichen Bildungsgradienten, auch auf Unterschiede zwischen verschiedenen gesellschaftlichen Kontexten hin, die einen Zusammenhang zwischen wohlfahrtsstaatlichen Institutionen und individuellen Alternsprozessen nahelegen. Zudem wird kritisiert, dass in der Operationalisierung des erfolgreichen Alterns häufig zu einseitig objektive Kriterien verwendet werden (Cosco et al. 2013). Eine weitere vielfach geäußerte Kritik am Konzept und seiner Operationalisierung lautet, dass es ein zu wenig differenziertes „one size fits all"-Modell sei, das der (subjektiven) Lebenswirklichkeit unterschiedlicher (Sub-)Populationen nicht hinreichend gerecht werde (z.B. Martinson & Berridge 2015). In der Tat erscheint es sinnvoll, zu hinterfragen, ob beziehungsweise inwieweit das Konzept und damit auch seine üblichen Operationalisierungen z.B. im Kontext von Migration (z.B. Torres 2001), für die LGBT-Population (z.B. Tree et al. 2020) oder andere distinkte Gruppen anwendbar ist und welche Anpassungen ggf. notwendig sind.

So stellt sich insbesondere aufgrund des demografischen Wandels die Frage, ob und inwieweit erfolgreiches Altern in der spezifischen Gruppe der Hochaltrigen gestaltbar ist. Die übergeordnete Forschungsfrage dieser Arbeit lautet daher, unter welchen spezifischen indivi-

[1] Weite Teile des Manteltexts sind als Sammelbandartikel veröffentlicht (vgl., Plugge & Hank (angenommen)).

duellen Bedingungen erfolgreiches Altern im hohen Alter ermöglicht werden kann. Aus der Identifikation dreier Forschungslücken, die im Folgenden aufgeschlüsselt werden, lässt sich diese Hauptfragestellung ableiten. Mithilfe dreier selbstständig durchgeführter Studien werden diese Forschungslücken anhand der empirischen Untersuchung des erfolgreichen Alterns bei Hochaltrigen weitestgehend zu schließen versucht.

Erstens gibt es Ergebnisse differenzierter Analysen des erfolgreichen Alters bisher nur für Personen im Alter von 65 bis 80 Jahren, da die verwendeten Datensätze für das hohe Alter zu kleine Stichproben aufweisen (Baker et al. 2009; Bosnes et al. 2017; Dahany et al. 2014; Hank 2011; Li et al. 2014; Whitley et al. 2018). Zweitens berechnen diese Studien die Prävalenzraten meist auf Basis von Querschnittsdaten, was die Dynamik des Alternskonzepts nur unzureichend abbilden kann. Die Untersuchung der Alterungsprozesse dieser Gruppe mithilfe von Längsschnittdaten ist daher notwendig, damit Herausforderungen und Veränderungen des Alterns über die Zeit analysiert werden können. Es ist noch wenig bekannt darüber, was neben Merkmalen wie Alter, Geschlecht und Bildung Veränderungen im Alternsprozess begünstigt. Daher wird bei der zweiten empirischen Untersuchung ein besonderer Fokus auf Lebensereignisse bzw. Übergänge gelegt, die im Alter wahrscheinlicher werden und solche Veränderungen möglicherweise beeinflussen können. Drittens sind bestimmte soziale Ungleichheiten für die Lebensphase der Hochaltrigkeit noch nicht untersucht. Bildung ist ein wichtiges Merkmal sozialer Ungleichheit, da diese die soziale Position eines Individuums im Wesentlichen mitbestimmt (Kerckhoff 1995; Spring 1977). Nach empirischen Ergebnissen der logistischen Regressionsanalyse objektiv gemessener Kriterien des erfolgreichen Alterns scheint der Bildungsgradient ebenfalls eine wichtige Rolle für das Altern Hochaltriger zu spielen (Plugge 2021). Da das ursprüngliche Konzept des erfolgreichen Alterns nach Rowe und Kahn (1997) vielfach kritisiert wird (Martinson & Berridge 2015), empfiehlt es sich, das Konzept der ‚gelingenden (aktiven) Lebensführung' nach Wagner et al. (2018b) zu verwenden, da dieses keine einseitig objektiven Kriterien umfasst und stattdessen Konstrukte beinhaltet, die Person-Umwelt-Konstellationen hinreichend abbilden.

Um diese drei Lücken zu schließen, erfolgt in der ersten Studie eine Bestandsaufnahme des erfolgreichen Alterns anhand objektiver und subjektiver Kriterien sowie eine empirische Überprüfung relevanter möglicher Determinanten mithilfe der NRW80+-Daten (N=1.863). Die zweite Studie untersucht diese Kriterien über zwei Befragungswellen der NRW80+-Studie (N=918) und prüft, inwiefern sich verändernde Lebenssituationen, z.B. durch Verwitwung oder den Umzug in eine institutionelle Einrichtung, auf Veränderungen des erfolgreichen Alterns auswirken. Die dritte Studie untersucht die Rolle der Bildung, indem überprüft

wird, inwiefern der Zusammenhang aus Bildung und der ‚gelingenden aktiven Lebensführung' nach Wagner et al. (2018b) durch materielle (z.B. Vermögen), verhaltensbezogene (z.B. Gesundheitskompetenz) oder psychologische (z.B. internales Kontrollerleben) Ressourcen mediiert wird. Diese drei Arten von Ressourcen leiten sich durch Forschungsstränge von Ross und Wu (1995, 1996) ab, die den Mechanismus aus Bildung und Gesundheit tiefergehend untersucht haben.

In Kapitel 1.1 wird der konzeptionelle Hintergrund dargestellt, indem zunächst das Konzept des erfolgreichen Alterns im Hinblick auf Ursprung, Evolution und Kritik des Begriffs näher beleuchtet wird. Daraufhin folgen die Definition und Merkmale der Hochaltrigkeit als Lebensphase. Diese sind erforderlich, um funktional äquivalente Indikatoren des erfolgreichen Alterns für das hohe Alter auszuarbeiten sowie allgemeine konzeptionelle Überlegungen für die Altersgruppe abzuleiten und diskutieren zu können. Ziel ist es hierbei, bereits vorliegende Überlegungen zur Konzeptualisierung (z.B. Gondo et al. 2013; Ribeiro & Araújo 2019) und empirischen Erfassung (z.B. Davies et al. 2010; von Faber et al. 2001) erfolgreichen Alterns im Kontext der Hochaltrigkeit insbesondere unter Bezugnahme auf die NRW80+-Studie (Wagner et al. 2018b) weiterzuentwickeln. Es werden sowohl Potenziale als auch Limitationen bei der Übertragung des Konzepts auf über 80-Jährige dargestellt. Bevor in Kapitel 2, 3 und 4 jeweils die einzelnen Studien im Detail beschrieben werden, werden diese nach Ausführung des konzeptionellen Hintergrunds in Kapitel 1.2 zunächst zusammengefasst. Anschließend folgen in Kapitel 5 ein Gesamtfazit in Bezug auf die Forschungsfragen der vorliegenden Arbeit, Limitationen der Ergebnisse, Empfehlungen für die zukünftige Forschung sowie Implikationen für die Praxis.

1.1 Konzeptueller Hintergrund

1.1.1 „Successful Ageing" – Überblick zu Ursprung, Evolution & Kritik des Begriffs

1.1.1.1 Ursprung und Evolution des Konzepts

Mit dem Konzept des erfolgreichen Alterns wollten Rowe und Kahn (1997) in der wissenschaftlichen Debatte die Dichotomie aus pathologischem und normalem Altern überwinden und durch eine ressourcenstarke Perspektive auf das Altern die zuvor dominierende defizitäre Perspektive ablösen. Erfolgreiches Altern wird als die Abwesenheit chronischer Erkrankungen oder krankheitsbedingter Beeinträchtigungen bei gleichzeitiger Aufrechterhaltung kognitiver und körperlicher Funktionen sowie als ein Altern definiert, das sich durch die Gestaltung eines aktiven Lebensstils kennzeichnet (Rowe & Kahn 1997, 2015). Nur die gleichzeitige Erfüllung all dieser Bedingungen bildet demzufolge einen erfolgreichen Alterungsprozess ab.

Die ursprüngliche Formulierung des Modells wurde stark rezipiert, aber auch vielfach kritisiert (Cosco et al. 2014; Katz & Calasanti 2015; Manierre 2018; Martinson & Berridge 2015). In einem erweiterten Modell des erfolgreichen Alterns reagieren Rowe und Kahn (2015) z.T. auf die Kritikpunkte am Ursprungsmodell und beziehen sowohl die Rolle *makrosozialer Strukturen* als auch die *Lebensverlaufsperspektive* stärker ein. Erstere weisen darauf hin, dass Strukturen wie beispielsweise der Zugang zu Gesundheitsleistungen den individuellen Alterungsprozess beeinflussen können (Rowe & Kahn 2015). Die Lebensverlaufsperspektive verweist auf die Abhängigkeit individueller Alternsprozesse von Erfahrungen in früheren Phasen des Lebenslaufs (Wagner & Geithner 2019). Rowe und Kahn schlagen hier u.a. vor, Hauptaktivitäten des Lebens wie Bildung, Arbeit, Erziehung, Freizeit und die Phase des Ruhestands zeitlich umzustrukturieren und auf die gesamte Lebensspanne auszuweiten (Rowe & Kahn 2015).

1.1.1.2 Allgemeine Kritik am Konzept des erfolgreichen Alterns

Das Konzept des erfolgreichen Alterns in der Formulierung von Rowe und Kahn wird insbesondere im Hinblick auf seine Operationalisierung kritisch diskutiert (Cosco et al. 2014; Katz & Calasanti 2015; Manierre 2018; Martinson & Berridge 2015; Tesch-Römer & Wahl 2017). In Bezug auf die Phase der Hochaltrigkeit lässt sich kritisieren, dass die Operationalisierung bisher nicht adäquat an die Merkmale dieser Gruppe angepasst wird und somit das hohe Alter in den gängigen Operationalisierungen des erfolgreichen Alterns nicht hinreichend berücksichtigt ist (vgl. hierzu ausführlich Plugge 2021). Anhand einer systematischen Literaturübersicht von Martinson und Berridge (2015) zeichnen sich vier Kategorien ab, unter denen sich Kritikpunkte an Rowe und Kahn bündeln lassen: Die erste Kategorie (*The Add and Stir group*) betont die erforderliche mehrdimensionale Erweiterung von Kriterien erfolgreichen Alterns wie zum Beispiel um Adaptionsstrategien. So kann nach Nikitin und Freund (2019) ein Individuum beispielsweise auch erfolgreich altern, indem es sich auf die biologischen, psychologischen und sozialen Aspekte seiner Lebenssituation einstellt und sich an altersbedingte Veränderungen anpasst. Eine ganzheitlichere Perspektive auf das erfolgreiche Altern als Prozess lässt sich u.a. bei Tesch-Römer und Wahl (2017) finden. Sie integrieren in das ursprüngliche Konzept von Rowe und Kahn individuelle Ressourcen und Opportunitätsstrukturen, die die Umwelt bietet, damit Lebenssituationen mit hoher Lebensqualität trotz Einschränkungen wie Pflegebedürftigkeit geschaffen werden können (Tesch-Römer & Wahl 2017).

Die zweite Kategorie (*The Missing Voices Group*) umfasst Erweiterungen um subjektive Einschätzungen und Vorstellungen der älteren Bevölkerung, die in vielen Alternsmodellen

nicht hinreichend berücksichtigt werden. Stattdessen liegt der Fokus in zahlreichen Studien auf einseitig objektiven Kriterien mit biomedizinischem Fokus (Cosco et al. 2013). Nach Katz und Calasanti (2015) zeigen hingegen individuell geprägte Lebensstile, wie unterschiedlich erfolgreiches Altern interpretiert werden kann. Beispielsweise ist die Ausübung eines Ehrenamts als produktive Tätigkeit nicht notwendiger Bestandteil eines jeden Lebensstils und somit auch kein generelles Erfolgskriterium für Alternsprozesse.

Die dritte Kategorie (*The Hard Hitting Critiques Group*) legt den Schwerpunkt auf Definitionen, die Stigmatisierung und Diskriminierung vermeiden und stattdessen Vielfältigkeit aufzeigen, während die vierte Kategorie (*The New Frames and Names Group*) alternative Alternskonzepte beschreibt, wie sie oft in östlichen Philosophien, z.B. im Buddhismus, verankert sind.

Cosco et al. (2014) kritisieren zudem die fehlende Konsistenz in der Operationalisierung erfolgreichen Alterns über verschiedene Studien hinweg. Während die Dimension der körperlichen Funktionsfähigkeit fast durchgängig berücksichtigt wird, führen Inkonsistenzen in der Berücksichtigung anderer Dimensionen zu uneinheitlichen Operationalisierungen und somit zu einer hohen Spannweite der beobachteten Prävalenzen erfolgreich Alternder selbst in der gleichen Population (Rolfson 2018).

1.1.2 Erfolgreich bis ins hohe Alter?

1.1.2.1 Definition und Merkmale der Hochaltrigkeit als Lebensphase

Die Altersgrenze, ab der Individuen als hochaltrig gelten, ist nicht eindeutig definiert (Motel-Klingebiel et al. 2013). Neben der bereits früh von Neugarten (1974) eingeführten Differenzierung zwischen ‚jungen' und ‚alten' Alten unterscheidet z.B. Baltes (1999) das *dritte* (ab ca. 60 Jahre) und *vierte* (ab 80-85 Jahre) Lebensalter (Baltes & Smith 2003; Kruse 2017). Dieser Unterscheidung liegt die Annahme zugrunde, dass mit dem hohen Alter die Wirkkraft gesellschaftlich-kultureller Faktoren sowie die Plastizität, also die Bandbreite der potenziell möglichen Veränderungsprozesse, aufgrund biologischer Abbauprozesse abnimmt, ohne dabei jedoch notwendigerweise vollständig zu verschwinden. Das *dritte* Alter ist typischerweise durch Aktivität, Engagement und Gesundheit gekennzeichnet und das Individuum behält seine physische und kognitive Funktionalität (Kruse 2017; Smith & Ryan 2016). Im *vierten* Lebensalter stehen biologische sowie funktionale Abbauprozesse im Vordergrund; es ist durch Multimorbidität, Fragilität, Vulnerabilität und Abhängigkeit charakterisiert. Allerdings werden in diesem Lebensalter auftretende Potenziale und Fähigkeiten ebenso betont (Motel-Klingebiel et al. 2013). Der Fokus liegt hierbei auf der wechselhaften Dynamik zwi-

schen Gewinnen und Verlusten, die durch die lebenslange Anpassung an altersbedingte Veränderungen zum Vorschein kommt (Baltes 1987).

Der Übergangspunkt vom dritten ins vierte Lebensalter kann nach Baltes und Smith (2003) zum einen *bevölkerungsbasiert* und zum anderen *personenbasiert* definiert werden. Die erste Definition legt jenes Alter als Übergang zur Hochaltrigkeit fest, bei dem 50 % einer Geburtskohorte verstorben sind. Der zweite Definitionsansatz legt die erwartbare Lebensspanne eines Individuums zugrunde und nicht die an der Gesamtbevölkerung durchschnittlich gemessene Lebensspanne. Graduelle individuelle Übergänge vom *dritten* zum *vierten* Lebensalter müssen allerdings bei beiden Ansätzen beachtet werden (Kruse 2017). Trotz einer fehlenden einheitlichen, disziplinübergreifenden Definition zur Bestimmung der Hochaltrigkeit dient die vorgestellte Kategorisierung mit der Altersgrenze von 80/85 Jahren als Orientierung für Forschung und Praxis sowie für die vorliegende Dissertation als grobes Ordnungsprinzip (Kruse 2017).

1.1.2.2 Funktional äquivalente Indikatoren des erfolgreichen Alterns im hohen Alter

Das *vierte* Lebensalter stellt in Bezug auf Kriterien wie Gesundheit, Abhängigkeit und Vulnerabilität eine andere Lebensphase dar als das *dritte* (vgl. 1.1.2.1). Die Erfolgskriterien von Rowe und Kahn lassen sich daher nicht eins zu eins auf Hochaltrige übertragen. Im Hinblick auf zukünftige Operationalisierungen werden im Folgenden mögliche funktional äquivalente Indikatoren diskutiert.

Ein Leben ohne Krankheit ist in der Hochaltrigkeit unwahrscheinlich. Dies bedeutet, dass für die Messung der *Abwesenheit von Krankheit* ein höherer altersspezifischer Durchschnitt chronischer Erkrankungen als Bewertungsmaßstab verwendet werden sollte. Dieser kann sich beispielsweise an Befunden zur Multimorbidität Hochaltriger orientieren. Für die Operationalisierung der *körperlichen Funktionalität* erscheinen Aktivitäten des täglichen Lebens als adäquate Kriterien, um den Grad der Autonomie zu messen. Aktivitäten wie beispielsweise das Zubereiten von Mahlzeiten oder die Hilfeinanspruchnahme bei der Körperpflege werden zur Bestimmung von Pflegegraden verwendet. Für die Abbildung der *kognitiven Funktionalität* sollte statt eines für alle Bevölkerungsgruppen geltenden allgemeinen Kognitionstests für Hochaltrige ein Test zur Erkennung leichter Demenz verwendet werden (Kessler et al. 2012).

Bei der Bewertung der sozialen Teilhabe sollte die Lebensverlaufsperspektive eine zentrale Rolle spielen, indem u.a. Lebensstilentscheidungen berücksichtigt werden. Für Hochaltrige, aber im Prinzip auch für jede andere Altersgruppe, erscheint es z.B. fragwürdig, ehrenamtliches Engagement als Erfolgskriterium heranzuziehen, wenn es zu keinem Zeitpunkt im Lebensverlauf eine Präferenz für diese Art sozialer Aktivität gab. Außerdem ist die Ausübung

eines Ehrenamts mit 13 % als Indikator *produktiver sozialer Teilhabe* im hohen Alter eher unwahrscheinlich. Bei dieser Dimension sollte zudem die eigene Erwerbstätigkeit als ursprüngliches Kriterium im Konzept von Rowe und Kahn ausgeschlossen werden, da nach empirischen Analysen nur 3 % der Hochaltrigen erwerbstätig sind. Diese Form der Teilhabe soll nach Rowe und Kahn (1997) allerdings keine ‚Produktivität' in einem ökonomischen Sinne beschreiben, sondern eine spezifische Art sozialer Integration darstellen. Soziale Unterstützung – in Form von Trost spenden oder bei Aufgaben anderer unterstützen – kann als Kriterium zur Messung des produktiven sozialen Engagements verwendet werden und ist nach empirischen Analysen bei der Hälfte der Hochaltrigen zu beobachten. Ein weiteres nützliches Kriterium könnte Generativität sein. Es wird allerdings insgesamt deutlich, dass ‚produktives' soziales Engagement insbesondere im Hinblick auf die Kriterien Ehrenamt und Erwerbsarbeit wenig geeignete ‚Erfolgskriterien' für Hochaltrige darstellen.

In Bezug auf die Dimension der *interpersonalen sozialen Teilhabe* sollten gerade bei Hochaltrigen nicht nur quantitative Strukturindikatoren wie beispielsweise Netzwerkgröße oder Häufigkeit von Kontakten, sondern auch Qualitätsindikatoren berücksichtigt werden (Ellwardt & Hank 2019). Die Berücksichtigung der subjektiven Bewertung sollte besonders in dieser Altersgruppe stärker gewichtet werden, da sie beispielsweise aufgrund alternstypischer Einschränkungen in der Gesundheit bei objektiven Kriterien tendenziell schlechter abschneidet. Darüber hinaus erscheint das Einbeziehen der subjektiven Perspektive vor allem für in institutionellen Wohnformen lebende Hochaltrige relevant: Diese sind per Definition zwar sozial eingebettet, können aber emotional anders verbunden sein als beispielsweise ein verheiratetes (Ehe-)Paar oder Individuen in selbstbestimmten Wohnkonstellationen. Bei der Bewertung sozialer Aktivitäten sollte berücksichtigt werden, dass bei hochaltrigen Heimbewohner*innen im Vergleich zu *jungen* Alten, die außerhalb ihres Haushalts aktiv sein können, pflegeheimtypische Aktivitäten als Maßstab gelten. Die subjektiven Indikatoren des erfolgreichen Alterns müssen im Gegensatz zu den objektiven Indikatoren nicht altersspezifisch angepasst werden.

1.1.2.3 Konzeptuelle Überlegungen zum erfolgreichen Altern im hohen Alter

Anknüpfend an die Überlegungen zu einer den spezifischen Bedingungen des hohen Alters angemesseneren Operationalisierung objektiver Indikatoren (vgl. 1.1.2.2) soll in diesem Abschnitt eine Perspektive entwickelt werden, die ganzheitlich ist und sowohl subjektive Indikatoren als auch kontextuelle Elemente mit einschließt.

Implizite normative Setzungen sind im Konzept des erfolgreichen Alterns nach Rowe und Kahn zahlreich enthalten. Der Gegenpol des erfolgreichen Alterns ist definitorisch betrachtet

ursprünglich das pathologische Altern (Rowe & Kahn 1997). Die Kehrseite des Erfolgs ist jedoch auch als Scheitern zu interpretieren. Dies wirft die Frage auf, inwieweit die individuelle Verantwortung bei Rowe und Kahn neoliberal überbetont wird (Rubinstein & Medeiros 2015). Danach sollen auch Hochaltrige sowohl Verantwortung für ihr erfolgreiches Altern übernehmen als auch Vorstellungen von Produktivität und Generativität im Ruhestand erfüllen. Die für Verantwortung notwendige Autonomie ist im hohen Alter jedoch unterschiedlich stark ausgeprägt und eine produktive soziale Teilhabe beispielsweise in Form eigener Erwerbsarbeit ist unwahrscheinlich. Die impliziten Normen des erfolgreichen Alterns gehen so an der Lebenswirklichkeit vieler Hochaltriger vorbei. Daher sollte das Konzept des erfolgreichen Alterns für Hochaltrige angepasst und erweitert werden.

Es bietet sich an, Schwellenwerte in der Definition des erfolgreichen Alterns an das hohe Alter anzupassen und zusätzliche Marker einzubeziehen, die die Wertewahrnehmungen älterer Menschen darstellen. Die Identifikation protektiver Faktoren, wie beispielsweise in Form von Bildung, hilft dabei, Interventionsstrategien zu entwickeln, die die Lebensqualität im hohen Alter sowie Lebensstilentscheidungen derart positiv beeinflussen, dass sie die Wahrscheinlichkeit erhöhen, gelingend zu altern (Tesch-Römer & Wahl 2017).

Der Begriff des erfolgreichen Alterns wird zudem oft mit dem der Lebensqualität im hohen Alter verknüpft (Neise et al. 2019). In diesem Zusammenhang erscheint das sog. CHAPO-Modell (*The Challenges and Potentials Model of Quality of Life*) als Erweiterung des Lebensqualitätsmodells von Veenhoven (2000) besonders interessant. Es beinhaltet u.a. ein Konzept der gelingenden Lebensführung für Hochaltrige, in dem Person-Umwelt-Konstellationen adäquat berücksichtigt werden (Wagner et al. 2018b). Das Konzept der gelingenden Lebensführung, mit Konstrukten wie funktionaler Lebensqualität, Kohärenz, Generativität und sozialer Einbettung, eignet sich auch für die Messung des erfolgreichen Alterns im hohen Alter (Veenhoven 2000; Wagner et al. 2018b).

Im CHAPO-Modell wird Lebensqualität sowohl ganzheitlich als auch subjektiv betrachtet. Für ein erweitertes Konzept des erfolgreichen Alterns sollten daher objektive Kriterien des Modells von Rowe und Kahn mit subjektiven Einschätzungen der Hochaltrigen kombiniert werden (siehe auch Neise et al. 2019). Im Rahmen des CHAPO-Modells werden subjektive Kriterien im Konstrukt ‚Wertschätzung des eigenen Lebens' repräsentiert, in dem neben dem affektiven und psychischen Wohlbefinden auch die Lebenszufriedenheit eine zentrale Rolle spielt (Wagner et al. 2018b).

Folglich kann der von Wagner et al. (2018b) eingeführte Begriff der ‚gelingenden (aktiven) Lebensführung' vom Individuum selbst als erfüllt betrachtet, aber neben der Wertschät-

zung des eigenen Lebens auch auf Grundlage der Wertschätzung anderer beispielsweise in Form von ‚Anerkennung von Leistungen' oder der ‚Akzeptanz des So-seins' bewertet werden. Zum einen ist es also vielversprechend, das traditionelle Konzept von Rowe und Kahn (1997) mit dem Lebensqualitätsmodell von Wagner et al. (2018b) zu erweitern. Zum anderen wird durch die Einbeziehung der Wertschätzung anderer auch die Akzeptanz restriktiver Bedingungen, wie Behinderung und Pflegebedürftigkeit, eröffnet. Hier setzt das Modell von Tesch-Römer und Wahl (2017) an. Dieses stellt individuelle, umwelt- und pflegebezogene Strategien für die Konstrukte Autonomie und Lebensqualität vor. Da Ziele wie eine vollständige Gesundheit bei (institutionalisiert wohnenden) Hochaltrigen unrealistisch sind, schlagen sie des Weiteren vor, für diese eine möglichst autonome Lebenssituation mit hoher Lebensqualität zu schaffen.

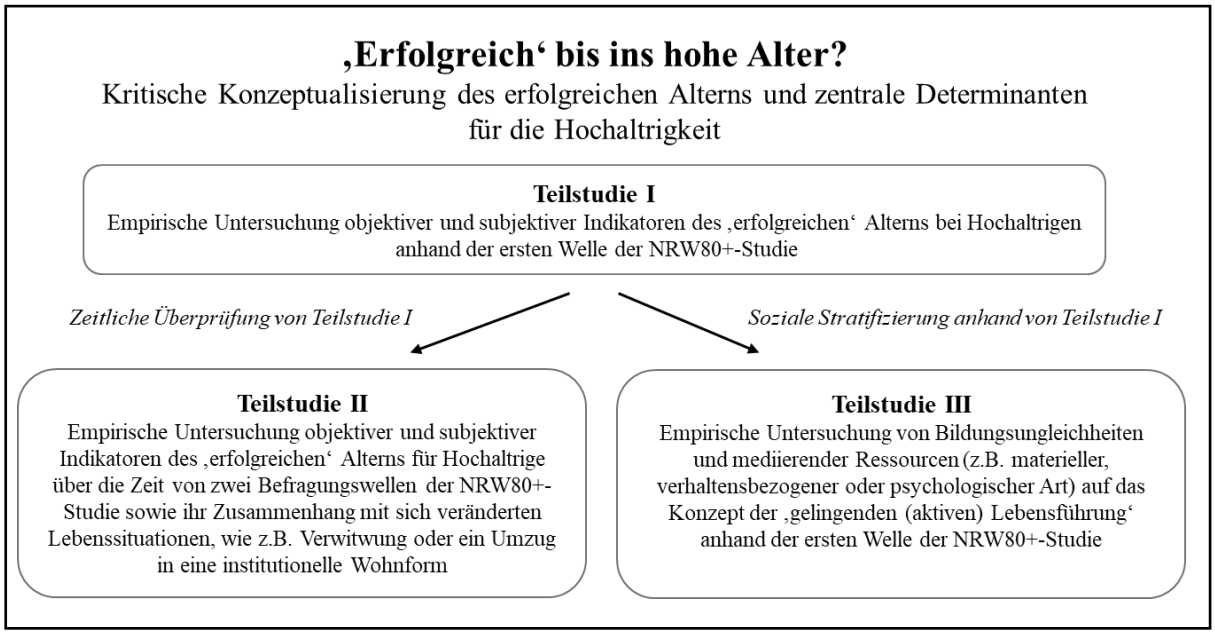
Einem Konzept für erfolgreiches Altern im hohen Alter sollte zunächst eine (Re-)Interpretation des Erfolgsbegriffs als ‚gelingende (aktive) Lebensführung' zugrunde liegen. Darüber hinaus ist die gelingende Anpassung des Individuums an seine Umwelt wie auch umgekehrt die gelingende Anpassung der Umwelt an ein Individuum zu integrieren. Beispielsweise kann sich ein Individuum durch Hilfsmittel wie einen Pflegedienst an die Situation seiner oder ihrer Pflegebedürftigkeit anpassen, wodurch das soziale Umfeld – die Umwelt – entlastet wird. Andererseits kann sich die Umwelt auf die Pflegesituation der oder des Angehörigen einstellen und den Fokus stärker auf die emotionale Beziehung legen. Die hier aufgezeigten konzeptionellen Grundsätze sind aus Überlegungen zur Hochaltrigkeit abgleitet, können aber auch altersunabhängig zu einer Weiterentwicklung des Modells zum erfolgreichen Altern beitragen. Dies war Ziel der vorliegenden Dissertation, die im Folgenden näher vorgestellt wird.

1.2 Aufbau und Zusammenfassung der Dissertation

Die übergeordneten Ziele der Dissertation sind die Konzeptualisierung und empirische Überprüfung des erfolgreichen bzw. gelingenden Alterns für die Gruppe der Hochaltrigen. *Teilstudie I* stellt dabei zunächst die allgemeine empirische Erforschung des erfolgreichen Alterns Hochaltriger dar, die als Grundlage und als erste empirische Bestandsaufnahme für *Teilstudie II* und *III* dient (vgl. Abbildung 1). Hierzu werden in der ersten Teilstudie die objektiven und subjektiven Indikatoren des erfolgreichen Alterns für Hochaltrige anhand der ersten Welle der NRW80+-Studie untersucht. *Teilstudie II* überprüft die in *Teilstudie I* untersuchten Indikatoren und Determinanten anhand der ersten und zweiten Befragungswelle der NRW80+-Studie zeitlich und analysiert den Zusammenhang mit veränderten Lebenssituationen, wie beispielsweise der Verwitwung oder ein Umzug in eine institutionelle Wohnform.

Die dritte Teilstudie stratifiziert die in *Teilstudie I* überprüften Determinanten und analysiert hierbei den Zusammenhang aus Bildung und ‚gelingender (aktiver) Lebensführung' im Detail. Dieses Konzept wird in *Teilstudie III* als adäquateres Konzept zum vielfach kritisierten klassischen Konzept des erfolgreichen Alterns verwendet, da dieses u.a. spezifisch an Hochaltrige angepasst ist. Die Rolle der Bildung für die ‚gelingende (aktive) Lebensführung' wird anhand potenziell mediierender Ressourcen materieller, verhaltensbezogener oder psychologischer Art untersucht.

Abbildung 1 Inhaltlicher Aufbau der drei Teilstudien



Für die empirischen Analysen der drei Teilstudien wurde der repräsentative NRW80+-Datensatz verwendet, der eine Befragung zur Lebensqualität und zum subjektiven Wohlbefinden Hochaltriger in Nordrhein-Westfalen umfasst (Wagner et al. 2018b). Die Daten liefern Informationen u.a. über Demografie, den materiellen, sozialen und gesundheitlichen Status, den Lebensstil, die Werte und Einstellungen von Personen im Alter von 80 bis 102 Jahren. Die Stichprobe der ersten Befragungswelle besteht aus 1.863 Interviews und die der zweiten Befragungswelle aus 912 Interviews, die aus den Einwohnermeldeämtern von 94 Kommunen des Landes Nordrhein-Westfalen gezogen wurden. Etwa 10 % der Interviews wurden stellvertretend mit Angehörigen oder Betreuungspersonen geführt, die nicht teilnehmen konnten, und 11 % der Interviews mit institutionalisierten Befragten. Um die relevanten Teilpopulationen vergleichen zu können, wurde ein Oversampling für Personen aus institutionellen Einrichtungen, für Männer und für Personen im ältesten Alterssegment (90+) durchgeführt. Die Daten wurden durch computergestützte persönliche Interviews mit einer durchschnittlichen Dauer von 1,5 Stunden erhoben. Die Erhebung der ersten Befragungswelle fand zwischen August

2017 und Februar 2018 mit einer Rücklaufquote von 23 % statt und die der zweiten zwischen Juli 2019 und Februar 2020.

Teilstudie I: Auf Basis der Befragungsdaten der NRW80+-Studie (Wagner et al. 2018b) und unter Verwendung verschiedener Operationalisierungen werden im Folgenden deskriptive Befunde zur Prävalenz erfolgreich Alternder im vierten Lebensalter vorgestellt. Die Befunde zum erfolgreichen Altern sind nicht nur wegen der expliziten Berücksichtigung der Heimbevölkerung in der Stichprobenziehung besonders, sondern auch, weil sie sowohl Messungen zu objektiven als auch zu subjektiven Indikatoren beinhalten. Diese erlauben eine ganzheitlichere Perspektive, wie sie von der Kritik gefordert wird (vgl. 1.1.1.2).

Zunächst werden fünf ‚*objektive*' Dimensionen der ursprünglichen Definition von Rowe und Kahn (1997) untersucht: (1) die Abwesenheit chronischer Erkrankungen, (2) die körperliche sowie (3) die kognitive Funktionsfähigkeit, (4) das interpersonale sowie (5) das produktive soziale Engagement. Hieraus wurde ein binärer Indikator hergeleitet, der den Wert eins annimmt, wenn eine Person alle fünf Kriterien erfolgreichen Alterns erfüllt.

Folgt man diesem Indikator, altern 9 % der Hochaltrigen in Nordrhein-Westfalen erfolgreich und nur 2 % pathologisch, d.h. sie erfüllen keines der fünf genannten Kriterien. Dieser Befund der NRW80+ Studie ist vergleichbar mit der Prävalenz ‚erfolgreicher' Hochaltriger (85+) in den Niederlanden (von Faber et al. 2001) und liegt nur relativ geringfügig unter den Durchschnittswerten, die in sich auf das dritte Lebensalter fokussierenden europäischen und nordamerikanischen Untersuchungen beobachtetet wurden (Hank 2011; McLaughlin et al. 2010). Setzt man einen etwas niedrigeren Schwellenwert an, bei dem bereits das Erfüllen von mindestens vier der von Rowe und Kahn vorgeschlagenen Kriterien als ausreichend betrachtet wird, machen erfolgreich Alternde sogar ein Drittel aller Hochaltrigen aus. Die meisten Hochaltrigen berichten trotz hoher Krankheitslast (68 %) und kognitiven (32 %) sowie körperlichen Beeinträchtigungen (70 %) über eine hohe interpersonale (94 %) und produktive Teilhabe (61 %), etwa in Form sozialer Aktivitäten, eigener Erwerbstätigkeit oder ehrenamtlichen Engagements.

Die Analyse *subjektiver* Kriterien erfolgreichen Alterns zeigt, dass die Befragten eine hohe durchschnittliche Lebenszufriedenheit aufweisen: Mehr als drei Viertel der Befragten (79 %) geben an, dass sie mit ihrem Leben insgesamt sehr zufrieden sind. Die Prävalenz des positiven Alternserlebens fällt ebenfalls hoch aus: 93 % aller Hochaltrigen bewerten ihr Alternserleben als positiv oder sehr positiv. Zwei weitere Indikatoren des subjektiven Wohlbefindens zeigen, dass Hochaltrige in den letzten zwölf Monaten häufig positive Gefühle erlebt haben und die Verbundenheit mit dem eigenen Leben positiv ausfällt. Die Diskrepanz der subjekti-

ven Bewertungen gegenüber objektiven Kriterien wird in den NRW80+-Befunden sehr deutlich: Definiert man ‚Erfolg' als hohe Lebenszufriedenheit bei gleichzeitig positivem Alternserleben, altern 65 % der Hochaltrigen subjektiv gemessen erfolgreich, jedoch nicht nach objektiven Maßstäben. Auf der anderen Seite erfüllen 11 % der objektiv erfolgreichen Hochaltrigen nicht die subjektiven Kriterien. Im Lebensverlauf erworbene Anpassungsmechanismen und Ressourcen bieten einen Erklärungsansatz für diese Diskrepanz (Baltes & Carstensen 1996; Brandtstädter & Renner 1990; Jopp et al. 2016). Diese Befunde auf Basis von NRW80+ offenbaren einige der impliziten normativen Erwartungen des Modells des erfolgreichen Alterns und weisen, übereinstimmend mit der generellen Kritik am Modell (vgl. 1.1.1.2), auf notwendige konzeptuelle Anpassungen für das vierte Lebensalter hin.

Teilstudie II: Trotz des demografischen Wandels wurden Konzepte des erfolgreichen Alterns als dynamischer, stabiler oder diverser Prozess bisher primär für Menschen unter 80 Jahren und meist anhand von Querschnittsdaten erforscht. Daher wurde in der zweiten Teilstudie erfolgreiches Altern anhand von zwei Befragungswellen der repräsentativen Hochaltrigenstudie NRW80+ (N = 912) im Alter von 80 bis 102 Jahren analysiert. In dieser Erhebung zur Lebensqualität wird die Entwicklung objektiv und subjektiv gemessener Kriterien des erfolgreichen Alterns über einen Zeitraum von ca. 1,5 Jahren untersucht. Darüber hinaus werden multiple lineare Regressionen berechnet, um zu analysieren, ob veränderte kritische Lebenssituationen wie die Verwitwung oder der Umzug in eine institutionelle Wohnform die Entwicklung der Kriterien des erfolgreichen Alterns im hohen Alter beeinflussen.

Es wird vermutet, dass es kritische Lebensereignisse gibt, die sich negativ auf den Alterungsprozess der Hochaltrigen auswirken können, sich diese Altersgruppe jedoch auch durch gute Anpassungsstrategien und -fähigkeiten auszeichnet, die dem negativen Einfluss entgegenwirken. In verschiedenen Ansätzen wird diskutiert, ob besonders ältere Menschen Fähigkeiten zur erfolgreichen Anpassung an Veränderungen und Anforderungen im Lebensverlauf entwickeln können (z.B., Jopp et al. 2016; Nikitin & Freund 2019). Dies führt zur Vermutung, dass die Veränderungen in den Ausprägungen des erfolgreichen Alterns über den untersuchten Zeitraum als nicht besonders hoch erwartet werden.

Bei der Mehrheit der Stichprobe ändert sich der Status des objektiv gemessenen Erfolgs tatsächlich nicht und war stabil. Bei subjektiven Messungen wie dem positiven Alternserleben, dem affektiven Wohlbefinden und der aktiven Verbundenheit mit dem Leben erlebt die Hälfte der Stichprobe Verschlechterungen, bei der Lebenszufriedenheit handelt es sich bei zwei Dritteln der Stichprobe um Veränderungen im Zeitverlauf. Die Entwicklung dieser Kri-

terien ist sehr dynamisch, jedoch sind – wie oben erwartet – die Unterschiede bei den subjektiv gemessenen Kriterien des erfolgreichen Alterns im Zeitverlauf nicht hoch.

Korrelationen zum erfolgreichen Altern zeigen, dass das interpersonale soziale Engagement, die Lebenszufriedenheit und die aktive Verbundenheit mit dem Leben mit dem Verwitwungsprozess signifikant abnehmen und das interpersonale soziale Engagement mit dem Umzug in eine institutionelle Wohnumgebung zunimmt. Diese Ergebnisse zeigen, dass erfolgreiches Altern bei den Hochaltrigen sehr unterschiedlich ausgeprägt ist und somit auch die Vulnerabilität der Gruppe als heterogen betrachtet werden sollte. Daher sollen der Gruppe der Hochaltrigen und besonders der Gruppe der vulnerablen Hochaltrigen besondere Aufmerksamkeit für ihre Bedürfnisse zuteilwerden.

Teilstudie III: Diese Studie stratifiziert erfolgreiches Altern anhand von Bildung aufgrund des signifikanten Gradienten in *Teilstudie I*. Die Erforschung erfolgreichen Alterns älterer Menschen benötigt allerdings einen konzeptionellen Rahmen, der ihre besonderen Bedürfnisse berücksichtigt. Im CHAPO-Modell werden einige Kriterien für ein solches darüberhinausgehendes Konzept beachtet. Dazu gehört die ‚gelingende (aktive) Lebensführung' (GaL) mit objektiven Indikatoren, z.B. funktionale Lebensqualität, und subjektiven Indikatoren, z.B. soziale Einbettung, Anomie, Verbundenheit mit dem Leben und positives Alternserleben. Bei einer Anpassung des klassischen Konzepts sollen strukturelle Ungleichheiten berücksichtigt werden. Bildung ist eine zentrale Determinante dieser, da sie für die soziale Stellung eines Individuums entscheidend ist. Für die Hochaltrigen wurde bisher nicht untersucht, ob Bildung eine Rolle für die GaL spielt. Zu diesem Zweck ist die Rolle der Bildung und weiterer Ressourcen von Interesse, die diesen Zusammenhang mediieren können, wie *materielle* Ressourcen, z.B. Wohlstand, *verhaltensbezogene* Ressourcen, z.B. Gesundheitskompetenz, oder *psychologische* Ressourcen, z.B. internales Kontrollerleben.

Allgemeine Strukturgleichungsmodelle für Bildung, mediierende Ressourcen und die GaL werden auf der Basis eines repräsentativen Querschnittsdatensatz der Hochaltrigen in Nordrhein-Westfalen (NRW80+, N=1.863) berechnet. Ein allgemeiner Bildungsgradient kann bei den Indikatoren der GaL nicht festgestellt werden. Lediglich beim objektiven Indikator der funktionalen Lebensqualität mit etwas stärkeren Zusammenhängen ist davon auszugehen, dass Bildung eine relevante Ressource für die GaL sein könnte. Ein Bildungsgradient könnte vor allem für Gesundheitsmarker gelten, jedoch eine geringere Rolle für subjektive Indikatoren spielen. Hinsichtlich der Mediatoren gibt es signifikante indirekte Effekte für die unterschiedlichen Arten von Ressourcen, jedoch ohne erhebliche Effektstärken. Aus dieser Teilstudie lässt sich ableiten, dass Ressourcen wie Bildung es wert sind, gefördert zu werden, weil

sie für eine GaL für Hochaltrige stützend sein können. Es müssen allerdings weitere Bedingungen erforscht werden, die eine GaL begünstigen.

Bevor in Kapitel 2, 3 und 4 die drei Teilstudien im Detail eingebettet sind, ist zunächst in Tabelle 1 eine Übersicht mit Titel, Forschungsfragen, Variablen- und Datenauswahl und Datenanalyse aufgeführt sowie anknüpfend in Kapitel 1.3 der Status dieser dargestellt.

Tabelle 1 Überblick der drei Teilstudien

	Teilstudie I (Kapitel 2)	**Teilstudie II** (Kapitel 3)	**Teilstudie III** (Kapitel 4)
Titel	Erfolgreiches Altern (EA) bei Hochaltrigen: Objektiv und subjektiv gemessene Evidenz aus einer bevölkerungsbasierten Erhebung in Deutschland	Erfolgreiches Altern (EA) der Hochaltrigen ist vielfältig, aber stabil: Objektiv und subjektiv gemessene Evidenz aus zwei Wellen einer bevölkerungsbasierten Erhebung in Deutschland	Die Rolle der Bildung für die ‚gelingende (aktive) Lebensführung' (GaL) der Hochaltrigen: Evidenz aus einer bevölkerungsbasierten Erhebung in Deutschland
Forschungsfragen	1) Ist EA im Sinne der objektiven Kriterien von Rowe und Kahn auch noch ab dem Alter von 80 Jahren möglich? 2) Sind die Prävalenzraten für EA im Alter höher, wenn die Kriterien subjektiv und nicht objektiv definiert werden?	1) Wie entwickeln sich objektive Kriterien des EA's bei Hochaltrigen im Laufe der Zeit? 2) Wie entwickeln sich subjektive Kriterien des EA's bei Hochaltrigen im Laufe der Zeit? 3) Welche Merkmale bestimmen die Veränderungen des EA's zwischen Welle eins und zwei bei den Hochaltrigen?	1) Lassen sich Bildungsunterschiede in der GaL der Hochaltrigen beobachten? 2) Können diese Unterschiede durch materielle, z.B. *Wohlstand*, verhaltensbezogene, z.B. *Gesundheitskompetenz*, und psychologische Ressourcen, z.B. *internales Kontrollerleben*, erklärt werden?
Abhängige Variablen	**Objektive Kriterien des EA's:** (I) Abwesenheit von Krankheit (II) Hohe körperliche Funktionalität (III) Hohe kognitive Funktionalität (IV) Hohes interpersonales soziales Engagement (V): Hohes produktives soziales Engagement	**Objektive Kriterien des EA's:** (I) Abwesenheit von Krankheit (II): Hohe körperliche Funktionalität (III): Hohe kognitive Funktionalität (IV): Hohes interpersonales soziales Engagement (V) Hohes produktives soziales Engagement	**GaL mit Person-Umwelt-Kontinuum:** (I) Funktionale Lebensqualität (II) Häufigkeit sozialer Einbettung (III) Anomie (IV) Verbundenheit mit dem Leben (V) Positives Alternserleben

	Indexvarianten: -*Variante I*: binäre Kodierung für alle fünf R&K-Dimensionen -*Variante II*: Dimensionen (I) bis (III) bleiben konstant, (IV) und (V) basieren auf dem besten oberen Drittel, d.h. zwei Drittel der Kriterien müssen erfüllt sein -*Variante III*: basiert auf Variante I, allerdings ohne das Kriterium ‚Erwerbsarbeit' -*Variante IV*: basiert auf Variante III mit dem zusätzlichen Kriterium des besten oberen Drittels (vgl. Variante II)	**Indexvariante:** Schwellenwerte basieren auf dem besten oberen Drittel; in Dimension (V) wird das Kriterium ‚Erwerbsarbeit' ausgeschlossen	
	Subjektive Kriterien des EA's: (I) Lebenszufriedenheit (II) Positives Alternserleben (III) Affektives Wohlbefinden (IV) Verbundenheit mit dem Leben	**Subjektive Kriterien des EA's:** (I) Lebenszufriedenheit (II) Positives Alternserleben (III) Affektives Wohlbefinden (IV) Verbundenheit mit dem Leben	
Unabhängige Variablen	Alter, Geschlecht, Familienstand, Bildung	Veränderung im Familienstand, Umzug in eine institutionale Wohnform, Alter, Geschlecht, Bildung	Bildung, Alter, Geschlecht *Mediatoren:* Wohlstand, Gesundheitskompetenz, Internales Kontrollerleben
Daten	NRW80+, N=1.863	NRW80+, Welle I & Welle II, N=912	NRW80+, N=1.863
Datenanalyse	Multivariate logistische & lineare Regressionsanalysen	Multivariate lineare Regressionsanalysen	Mediationsmodelle anhand von allgemeinen Strukturgleichungsmodellen

1.3 Status der Studien

Teilstudie 1 (Kapitel 2): „Erfolgreiches Altern bei Hochaltrigen: Objektiv und subjektiv gemessene Evidenz aus einer bevölkerungsbasierten Erhebung in Deutschland“, ist von mir in Allein-Autorenschaft verfasst und im *European Journal of Ageing* veröffentlicht.

Teilstudie 2 (Kapitel 3): „Erfolgreiches Altern der Hochaltrigen ist vielfältig, aber stabil: Objektiv und subjektiv gemessene Evidenz aus zwei Wellen einer bevölkerungsbasierten Erhebung in Deutschland“, ist von mir in Allein-Autorenschaft verfasst und seit April 2022 im Reviewprozess bei *Ageing and Society*.

Teilstudie 3 (Kapitel 4): „Die Rolle der Bildung für die ‚gelingende (aktive) Lebensführung‘ der Hochaltrigen: Evidenz aus einer bevölkerungsbasierten Erhebung in Deutschland“ ist in Ko-Autorenschaft mit Dr. Merih Ates (DeZIM-Institut, Berlin) verfasst, wobei ich die Erstautorin des Manuskripts bin. Gemeinsam haben wir die Forschungsfrage entwickelt und die Studie konzeptioniert. Im weiteren Verlauf habe ich den theoretischen Hintergrund des Manuskripts verfasst, die empirischen Analysen durchgeführt und ihre Ergebnisse sowie ihre Diskussion im ersten Entwurf verschriftlicht. Merih Ates trug zur Erstellung des Manuskripts bei, indem er verschiedene Versionen des Manuskripts kommentierte. Seit Oktober 2022 ist das Manuskript bei *Ageing and Society* im Reviewprozess.

2 Successful Ageing in the Oldest Old: Objectively and Subjectively Measured Evidence from a Population-Based Survey in Germany[2]

Abstract

Despite rapid increase of people aged 80 and over, concepts of successful ageing (SA) are primarily examined for people below that age. Therefore, successful ageing was examined in a population-based representative sample of N=1,863 people aged 80 to 102 (NRW80+) with 11 % living in institutionalized settings. In this survey on quality of life and well-being, multiple linear and logistic regression models were used to calculate the distribution of successful agers. According to Rowe and Kahn's objective definition, 9 % of the sample aged successfully, but one third (33 %) still met four to five SA criteria. This is in line with the theoretical a priori criterion of 10 % in a normal distribution of a sample, while 80 % age normally and 10 % pathologically. However, averages of life satisfaction, affective well-being, positive ageing experience and valuation of life were high. The majority of the oldest old (65 %) are successful agers in their own subjective perception, which is not in line with objective measurements. Moreover, 11 % of objectively measured successful agers, do not meet subjective criteria. These empirical findings reveal a remarkable discrepancy between objective and subjective criteria of SA. Future research on concepts that define successful ageing for the oldest old should consider more holistic markers of success, e.g., outcomes of productive social engagement.

Key Words: successful ageing, critical gerontology, subjective well-being, oldest old

[2] Angemerkt sei, dass bei den drei Teilstudien die Nummerierung der Tabellen sowie der Abbildungen an den vorliegenden Manteltext angepasst wurde und diese somit aufeinander folgen.

2.1 Introduction

The concept of successful ageing (SA) as proposed by Rowe und Kahn (1997) aimed at shifting the perspective from a deficit to a resource-oriented focus on ageing to overcome the dichotomy of pathological and normal ageing. This well-known, likewise probably most criticized concept (Cosco et al. 2014; Katz & Calasanti 2015; Manierre 2018; Martinson & Berridge 2015) is based on objective criteria. It describes SA as absence of chronic diseases or illness-related impairments while maintaining cognitive and physical functions and an active lifestyle (Rowe & Kahn 1997, 2015). Considering these criteria for different age groups and the ageing process as a whole, the following questions need to be asked: How long can this "successfulness" be preserved and which prerequisites are necessary for it? And should success be measured based on objective criteria only?

These questions are of special interest for the fourth age, which is characterized by health restrictions and the need for care (Kruse 2017; Smith & Ryan 2016). However, this group of oldest old scores well in subjective criteria, e.g., constructs of subjective well-being (Jopp et al. 2008). This unexpected discrepancy between objective and subjective SA indicators might be explained by approaches of adaptation process of ageing, e.g. *selection-optimization-compensation theory* according to Baltes und Carstensen (1996) or *two-process model* according to Brandtstädter und Renner (1990). Common features of these theories are strategies of older people and their adaptability to deal with negative age-related influences. This means that older people develop skills in their life-course for the successful adaptation to changes and demands (Jopp et al. 2016; Nikitin & Freund 2019).

Although directly arisen from the criticism that was brought forward in a long debate about deficits of the oldest old, the concept of SA has hardly been examined in this age group. Differentiated analyses can only be made for people aged 65 to 80, while research on SA has too small sample sizes of people aged 80 or over (Baker et al. 2009; Bosnes et al. 2017; Dahany et al. 2014; Hank 2011; Li et al. 2014; Whitley et al. 2018). However, this age group demands more attention due to its rapid growth. In Europe, their proportion of the population will double in 2070 (Eurostat 2018). In Germany, about one in eight people will be 80 or older by 2060 (Statistisches Bundesamt 2015). The age limit which defines individuals to be very old is not clearly defined (Motel-Klingebiel et al. 2013). Despite the lack of a uniform, cross-disciplinary definition for determining very old age, the categorisation with the age limit of 80 years serves as an orientation for research and practice (Kruse 2017).

Based on these considerations, this paper addresses these two specific research questions:

(I) Is successful ageing as defined by Rowe and Kahn's objective criteria still possible from the age of 80 years up? The key contribution is to analyse the SA model by Rowe and Kahn (1997) with a dataset of the oldest old.

(II) Are prevalence rates for successful ageing in old age higher if the criteria are defined subjectively rather than objectively? This will contribute to gaining a more holistic perspective on SA and will build on the critiques of Rowe and Kahn's concept by Cosco et al. (2014) and Martinson und Berridge (2015).

The empirical analyses to answer these questions use the representative data set of very old people in Germany (NRW80+, N=1.863). This study enables to determine the distribution of SA for a population aged 80 and over in detail and to compare analyses of subjective and objective criteria for the first time. The sample is characterized by an overrepresentation of nursing home residents (Wagner et al. 2018b). This group is often excluded from population surveys due to institutional or personal access barriers (Schanze 2017). Consequently, assumptions might be distorted since the residents' specific life situation and perspectives can lead to a lack of participation (Kelfve et al. 2013; Wagner et al. 2018a).

2.2 Literature Review

2.2.1 Concept and Theoretical Anchoring of SA in the Oldest Old

The MacArthur model of SA developed by Rowe und Kahn (1997) was a starting point to overcome the dichotomy of pathological and normal ageing. While this deficit-oriented classification had dominated the field before, they wanted to take a resource-rich perspective instead. Therefore, Rowe and Kahn proposed to apply a normal distribution and differentiate between three types of ageing:10 % *pathological*, 80 % *normal* and 10 % *successful* agers.

According to these objective criteria, individuals are successful agers if they have (1) no chronic diseases and disabilities, (2) high cognitive and (3) physical functions and if they are (4) interpersonally and (5) productively integrated (Rowe & Kahn 1997, 2015). This approach was severely criticized (Cosco et al. 2014; Katz & Calasanti 2015; Manierre 2018; Martinson & Berridge 2015). In particular, challenges such as the onset of the need for care due to health restrictions can influence the social inclusion of the oldest old. Incorporating the criticism, Rowe und Kahn (2015) adapted their SA model while focusing on macrosocial structures, i.e., considering the ageing process in a societal context with remarkable influences on social contacts (Rowe & Kahn 2015). Several concepts have been proposed to better understand the consequences of restrictions in health and functional capacity on leading independent and satisfying lives, some of which refer explicitly to very old age.

The CHAPO (*The Challenges and Potentials*) model, in extension of the model of Veenhoven (2000), explicitly suggests including a conceptual domain of successful life conduct in order to address person-environment constellations in the oldest (Wagner et al. 2018b). Many concepts of successful life conduct are characterized by both the internal value system of the individual as well as the normative values given by the environment. With regard to life achievements, a successful lifestyle can be described, for example, through the degree of social integration (Veenhoven 2000; Wagner et al. 2018b). The model displays that quality of life must be viewed both holistically and subjectively. The latter is represented by the aspect "appreciation of own life" (Wagner et al. 2018b), in which life satisfaction and affective and psychological well-being play a central role.

Consequently, successful life conduct as introduced by Wagner et al. (2018b) may be experienced as fulfilling for the individual but also appreciated by others. This provides the possibility of integrating both the individual-focused traditional concept of SA proposed by Rowe und Kahn (1997) as well as the macrosocial perspective suggested by Tesch-Römer und Wahl (2017). They describe a model which includes those who grow old with disabilities and care needs (Tesch-Römer & Wahl 2017). The model presents individual, environmental and care-related strategies for autonomy and quality of life and emphasize inter-individual differences and social inequality in old age. The analyses carried out here consider comparisons between individuals in institutionalized versus private settings plus demographics that might reinforce social inequality.

2.2.2 Distribution of SA in the Third Age

Research on SA has been conducted in Europe (Bosnes et al. 2017; Dahany et al. 2014; Hank 2011; Whitley et al. 2018), in the US (McLaughlin et al. 2010) and in Asia (Nakagawa et al. 2020). However, it has not yet been possible to examine the concept empirically and apply it to very old individuals due to incompleteness, complexity of the Rowe and Kahn model and lack of available data (Dahany et al. 2014). A few studies consider the oldest, but these cannot differentiate between people aged under or over 80 years (Baker et al. 2009; Bosnes et al. 2017; Hank 2011; McLaughlin et al. 2010; Whitley et al. 2018). Consequently, previous analyses of SA only apply for people in the third age, which ranges from 65 to 80 years (Baltes 1999).

In Germany, the proportion of successfully ageing people in the third age is 12 %, while the overall average of 14 European countries and Israel is 8.5 % (Hank 2011). Cross-sectional studies of Canada show a proportion of 11 % successful agers from 60 years up (Baker et al.

2009). This is very similar to the results of longitudinal studies of the United States by McLaughlin et al. (2010) with a prevalence rate of 12 %. By contrast, a French sample incorporating age ranges only from 65 up to 75 years shows higher proportions with 30 % successful agers (Dahany et al. 2014). This is in line with the result of a systematic review which found an average proportion of 26 % in the United States, Canada, United Kingdom, Australia, and counting (Cosco et al. 2014). Apart from that, gender differences were examined in Korea, resulting in prevalences of 14 % and 9 % for men and women, respectively (Kim et al. 2019).

Although these findings provide an orientation for the worldwide prevalence rate of SA in the third age, they are not sufficiently comparable due to different sample sizes, age limits and methods. Therefore, it is even more difficult to draw conclusions for the fourth age. Due to their declining health status, it can be assumed that the proportion of SA is lower in people aged 80 and over compared to younger samples. Hence, for the analysis of a German sample of oldest old, a SA proportion lower than 12 % is to be expected.

2.3 Methods

2.3.1 Data

The analyses were conducted using the first wave of data collection from the representative German "Survey on quality of life and subjective well-being of the very old in North Rhine-Westphalia (NRW80+)", the most populous federal state of Germany (Wagner et al. 2018b). The study goal was to establish a database for the oldest old to explain differences in quality of life outcomes. This cross section provides information about demographics, the material, social and health status, life style, values and attitudes of individuals aged 80 to 102 years. The sample consisted of 1,863 interviews drawn from registration offices of 94 municipalities in the state North Rhine-Westphalia. Approximately 10 % constituted proxy interviews with relatives or caregivers for individuals who were unable to participate and 11 % of the interviews were conducted with institutionalized respondents (see Table 1). To contrast the relevant subpopulations, oversampling was performed for persons from institutionalized settings, for men, and for persons in the oldest age segment. For this reason, the proportion of male is 50 %, although the proportion of women outnumbers men in this age segment.

The data were generated through computer-aided personal interviews with an average duration of 1.5 hours. This instrument has been developed at the Center for Ethics, Rights, Economics and Social Sciences of Health (ceres) at the University of Cologne. The study was approved by the Research Ethics Committee at the University of Cologne (17-169). Data col-

lection took place between August 2017 and February 2018 with a response rate of 23 % (Wagner et al. 2018b). Both the objective and subjective indicators of SA (see 2.3.2) were measured by this unique data of the oldest old.

Table 1 Sample Characteristics

Characteristics	**%**	**N**
Age groups		1,863
80-84	39	728
85-89	34	625
90+	27	510
Sex (male)	50	927
Marital status		1,862
Married	41	755
Widowed	52	969
unmarried/divorced/separated	7	138
Educational classification		1,729
Low	24	421
medium	54	929
High	22	379
Institutionalized	11	195
A degree of care	36	654

Note: unweighted data with N=1,863

2.3.2 Variables

2.3.2.1 Objective Criteria of SA

Traditionally, SA has been assessed based on the definition of Rowe und Kahn (1997), but different researchers have measured it in a variety of ways. There is no consistency in the definition of SA (Cosco et al. 2014). This study provides a post-hoc definition by replicating the operationalization of three major recent European ageing studies: the Nord-Trøndelag Health Study (Bosnes et al. 2017), SHARE (Hank 2011), and the West of Scotland Twenty -07 cohort study (Whitley et al. 2018). The results of a construct validity study about the operationalization using confirmatory factor analysis showed best model fit if the dependent variable SA included all dimensions described by Rowe and Kahn's concept. In addition, it is recommended to allow differences between the single dimensions (Kleineidam et al. 2019).

Hence, SA is a binary indicator that equals 1 if all five dimensions are fulfilled and 0 if not. The dependent variables consist of this overall indicator and its individual binary coded components. To make the operationalization as transparent as possible and in order to show differences depending on the researcher's subjective election of variables, four overall indicators by different coding schemes were applied (see

Table **2**).

Table 2 Overview of Different Variants on Indicators to Measure Objective Criteria of SA

VARIANTS	**SA-I** absence of disease	**SA-II** physical functioning	**SA-III** cognitive functioning	**SA-IV** interpersonal social engagement	**SA-V** productive social engagement
Variant I: binary coding of all dimensions	absence of eight chronic diseases [3]	14 items on "(instrumental) activities of daily life"	screening procedure for mild forms of dementia	social activities, frequency of social contacts & living with others	paid work, volunteering, supporting others in tasks or services, give comfort, association membership
Variant II: dimensions **(SA-I)** to **(SA-III)** remain constant, dimensions **(IV)** and **(V)** are not coded with "yes" or "no", instead the criterion "successful" is based on the best third (Whitley et al. 2018) that means two thirds of the criteria must be fulfilled					
Variant III: based on *Variant I* without paid work	**SA-I**	**SA-II**	**SA-III**	**SA-IV**	**SA-V** without paid work
Variant IV: based on *Variant III* with the coding criterion of the upper engaged third (comparable to *Variant II*)					

Note: For further details about instruments, operationalization and distribution see **Table 9** in the appendix

2.3.2.2 Subjective Criteria as Indicators for SA

This operationalization aims to describe how success can be measured by subjective criteria from the perspective of the 80+ population. In fact, in this population, subjective criteria seem far more valuable to determining success because chronic diseases are exceedingly common. However, this is only an issue if it interferes with one's ability to engage in a lifestyle that is satisfying and meaningful. The subjective assessments can help highlight the ways to identify which older people in this phase of the life course are thriving. The construct "appreciation of own life" (Wagner et al. 2018b) can be operationalized by life satisfaction, affective and psychological well-being (see 2.2.1). Processes of staying attached or connected to life may become increasingly important in light of diminishing resources in the oldest old (Wahl et al. 2012). This attachment is operationalized by ageing experience. Various measurements of subjective perceptions were conducted (see Table 3). In order to gain an overall

[3] coronary heart disease, stroke, chronic obstructive pulmonary disease (COPD), cancer (skinless), diabetes, Parkinson's disease and depression

indicator of the subjective perception and to draw comparisons with objective criteria, the very satisfied and those with very positive ageing experience were summarized in one indicator.

Table 3 Overview of Subjective Criteria as Indicators for SA

CONSTRUCT	Operationalization	Scale	References
Overall life satisfaction	general life satisfaction	*10-point scale* from "very dissatisfied" to "fully and completely satisfied"	Ryff (1989)
Positive & negative Ageing Experience	abridged version of awareness of age-related change (AARC); each subscale with *1.* "more appreciate relationships and other people", *2.* "paying more attention to health", *3.* "more experience to assess things and people", *4.* "better sense of what's important", *5.* "freedom to spend days of one's own free will"	*five-step scale* from 1="not at all" to 5="very strong"	Brothers et al. (2016); Kaspar et al. (2019)
Affective Well-Being	PANAS short scale with positive feelings experienced in the past twelve months with *1.* "attentive", *2.* "joyous", *3.* "expectant", *4.* "animated", *5.* "determined"	*five-step scale* from 1="never" to 5="very often"	Kercher (1992)
Valuation of Life	average of *1.* "optimistic", *2.* "looking forward to many things every day", *3.* "finding current life useful", *4.* "life is determined by religious or moral principles", *5.* "strong will to live", *6.* "life has a meaning", *7.* "achieving life's goals", *8.* "hopeful attitude", *9.* "making the best of life", *10.* "finding ideas out of difficult situations", *11.* "ways to achieve important things", *12.* "way to solve problems", *13.* "achieving self-imposed goals	*three-step scale* from 0="no" and 2="yes"	Lawton et al. (1999)

2.3.2.3 Independent Variables

The statistical analyses are controlled for socio-demographic variables, namely age, sex, marital status, and education. Age was categorized in three groups (80-84 years, 85-90 years and 90+). The reason to split the sample into these groups is due to approximately the same size of proportion (see Table 1). Furthermore, age is a very interesting variable to analyse the success of ageing by itself. To get more detail about the success of each ageing group it is

necessary to examine if there is a difference between these groups. The marital status was divided in married, widowed, divorced, and unmarried. Education was separated into the categories low, medium, and high. Low includes respondents without any completed vocational training and with a secondary school leaving certificate or lower. The category medium education comprises individuals with completed vocational training or a university entrance qualification. High level includes respondents who have completed their studies.

2.3.3 Statistical Analysis

The analyses test the empirical evidence for the assumption that different ways of living affect how "good" life is as perceived by the very old themselves. First the distribution of successful agers and their five domains were calculated. Multivariate logistic regression analyses were used to assess the independent effects of each variable's ability to explain SA through objective markers. The estimates are presented as odds ratios (OR) with 95 % confidence intervals (CI). Second, rates for subjective definitions of SA were calculated (see section 2.3.2.2). Moreover, multivariate linear regression analyses were conducted with subjective perceptions as dependent variables.

To account for unit nonresponse, the population weight for North Rhine-Westphalia was applied in the descriptive analysis of the distribution of successful agers. For regression analyses, personal calibration weights were calculated to obtain undistorted estimates. The cluster structure at municipal level was additionally used for the purpose of undistorted estimates in the regression analyses. The original sample size of 1,863 respondents is reduced to 1,413 in logistic regressions and to 1,658 in linear regressions as there are missing values for dementia diagnosis and subjective evaluation criteria of proxy interviews. Statistical significance was set to $p < 0.05$ by analyses with Stata (version 16). Reliability was investigated using Cronbach's alpha.

2.4 Results

2.4.1 Bivariate Analyses of Objective and Subjective Criteria for SA

The distribution of SA is shown in Table 4. In the first variant with binary measurement, 9 % age successfully, which means that all five criteria are met, while 2 % do not meet any of the criteria. In between, 89 % fulfil one to four criteria, while one third meets four to five criteria. The following distribution rates can be calculated for the five criteria: Almost two thirds of the participants show good cognitive functioning and nearly all have a high level of inter-

personal social participation. Productive social engagement is present in two thirds of cases. Finally, one third has good physical functionality and no chronic diseases.

In the second variant where the upper third of social participation is considered as successful, there are clear deviations from variant one. According to this measurement, interpersonal social engagement is high for two thirds in contrast to the previous proportion of 94 %. A high level of productive social participation is shown for only 6 % instead of 61 %.

Table 4 Distribution of Objectively Measured Criteria of SA in the Oldest Old

Measurements of SA	**%[1]**	**%[2]**	**%[3]**	**%[4]**	**P**	**I**
Criteria of SA						
SA-I: Absence of disease	32	-	-	-	90	10
SA-II: Good physical functioning	30	-	-	-	98	2
SA-III: Good cognitive functioning	68	-	-	-	94	6
SA-IV: Good interpersonal social engagement	94	68	-	-	85	15
SA-V: Good productive social engagement	61	6	60	21	93	7
Compliance with the criteria						
No criteria	2	12	2	11	98	2
One out of five	12	20	12	19	63	37
Two out of five	24	32	24	29	76	24
Three out of five	29	25	29	23	91	9
Four out of five	24	10	24	14	96	4
All criteria fulfilled/ successful agers	9	1	9	4	99	1

Note: [1]: binary coding for all five dimensions; [2]: upper third measurement concerning dimension social engagement; [3]: without criterion "paid work" concerning dimension productive social engagement (binary measurement); [4]: without criterion "paid work" concerning dimension productive social engagement (upper third measurement); P=private housing type; I=institutionalized housing type; N=1.863; weighted data with population size N=1,077,296.

60 % are rated as good agers following variant three which excludes paid work as a criterion for productive social participation. This is comparable to variant one (61 %). Variant four which does not consider paid work and with the best third has a much lower value than variant three and a much higher value than variant two (21 % vs. 60 % vs. 6 %). A huge difference between private and institutionalized settings is shown by comparisons of successful agers (99 % vs. 1 %). This finding is equivalent in all five criteria and evident in the compliance with these criteria.

The first set of analyses of subjective criteria as indicators for SA (see Table 5) showed high average levels of life satisfaction (79 %). The distribution of positive ageing experience supports the hypothesis of high subjective perceptions, with more than half rating their ageing experience as positive and even more than a third as very positive. The mean values of positive and negative ageing experiences are high, too (3.2 on a five-point scale). Comparisons between private and institutionalized settings show small differences, but these are not as high as in objective measurements (see Table 4).The mean values of ageing experience, affective

well-being and valuation of life are even smaller in institutionalized settings than in private residents (see Table 5).

Table 5 Distribution of Subjective Perceptions of SA in the Oldest Old

Subjective Perceptions	**Total** in %/M	**Private** in %/M	**Institutionalized** in %/M
Overall satisfaction with life			
very satisfied	79	90	10
somewhat satisfied	17	75	25
dissatisfied	4	60	40
Positive ageing experience			
very positive	37	91	9
positive	56	86	15
less positive	7	66	34
Total	100		
Ageing experience			
positive	3.2	3.2	2.8
negative	2.8	2.7	3.4
Affective Well-Being	3.3	3.3	2.8
Valuation of Life	1.5	1.6	1.2

Note: weighted data with population size N=1,077,296; scale of "positive and negative ageing experience" from 1="not at all" to 5="very strong; scale of "affective well-being" from 1="never" to 5="very often"; scale of "valuation of life" from 0="no" to 2="yes"; M=Means

There are two further measurements of subjective well-being: The mean values of the PANAS short scale show that with a scale value of 3.3, most older individuals have "sometimes" to "often" experienced positive feelings in the past twelve months. The average value of valuation of life is with 1.5 on a scale from zero to two rather high.

Table 6 Objectively Measured vs. Subjectively Measured Criteria of SA

Measuring mode	**Not subjectively measured SA**	**Subjectively measured SA**
Objectively measured success		
Normal/pathological	35	65
Successful	11	89
Total	32	68

Note: weighted data with population size N=1,077,296

When drawing comparisons between the measuring modes of success on ageing, there is evidence of a discrepancy: More than two thirds are subjectively measured successful agers, but this proportion is not confirmed by objective measurements. By contrast 11 % of objectively measured successful agers do not meet subjective criteria (see Table 6).

2.4.2 Multivariate Analyses of Objective and Subjective Criteria for SA

The results of the multivariate logistic regression analyses are presented in Table 7. The first binary-coded regression analysis shows that younger age and a higher degree of education significantly correlate with SA. By contrast, gender and marital status show no significant influence. The regression analysis of variant two does not indicate any presentable results since the dependent variable with only 2 % of successful agers shows too little variance. Variants three and four do not differ from variant one in regarding age, sex, and marital status. However, the coefficient of higher educational attainment in variant four is twice as high as in variants one and three.

When analysing the correlations with the individual dimensions of SA, there are interesting differences to the global measurement: Increasing age significantly reduces the absence of diseases. Male sex predicts a significantly higher probability of good physical functionality while female sex and being widowed correlate significantly with a good cognitive functionality. However, being widowed significantly reduces the probability of high physical functionality and high interpersonal social engagement. This also applies to unmarried or divorced individuals. Higher levels of education are significantly associated with high physical and cognitive functionality as well as with high productive social engagement.

Table 7 Results of Multivariate Logistic Regressions for Objective Measurement of Global SA and Single Dimensions

VARIABLES	**SA Variant I**	**SA Variant II**	**SA Variant III**	**SA Variant IV**	**SA-I** absence of disease	**SA-II** good physical functioning	**SA-III** good cognitive functioning	**SA-IV** good interper-sonal social engagement	**SA-V** good produc-tive social engagement
Age groups									
85-89	0.50*** (0.12)	n.c	0.52** (0.12)	0.41*** (0.14)	0.75* (0.11)	0.33*** (0.06)	0.53** (0.10)	0.97 (0.32)	0.56*** (0.09)
90+	0.11*** (0.05)	n.c	0.12*** (0.05)	0.08*** (0.06)	0.58*** (0.10)	0.15*** (0.03)	0.30*** (0.06)	0.69 (0.23)	0.40*** (0.07)
Sex (female)	1.13 (0.26)	n.c	1.15 (0.26)	1.22 (0.38)	1.12 (0.16)	0.62*** (0.10)	1.57** (0.27)	1.30 (0.46)	1.11 (0.18)
Marital status									
widowed	0.74 (0.21)	n.c	0.72 (0.20)	0.72 (0.27)	1.00 (0.17)	0.67** (0.13)	0.80 (0.14)	0.04*** (0.04)	0.74* (0.14)
unmarried	0.53 (0.29)	n.c	0.53 (0.29)	0.37 (0.28)	0.77 (0.21)	0.97 (0.27)	0.56** (0.15)	0.04*** (0.04)	0.59** (0.15)
Education									
medium	1.12 (0.33)	n.c	1.20 (0.37)	1.60 (0.90)	0.99 (0.18)	1.58** (0.31)	1.80*** (0.28)	1.06 (0.35)	1.32 (0.24)
high	2.09** (0.71)	n.c	2.22** (0.79)	4.30** (2.49)	1.14 (0.24)	2.28*** (0.54)	5.22*** (1.42)	0.99 (0.49)	2.15*** (0.56)
Constant	0.14*** (0.05)	n.c	0.13*** (0.05)	0.04*** (0.02)	0.54*** (0.10)	0.80 (0.19)	1.63** (0.38)	216.87*** (208.71)	2.13*** (0.50)
Observations	1,413	-	1,413	1,413	1,413	1,413	1,413	1,413	1,413

Note: Odds Ratios, person calibration weights & clustering, standard errors in parentheses, *** p<0.001, p<0.05**, p<0.01*, *Variant I*: binary coding for all five dimensions; *Variant II*: upper third measurement concerning dimension social engagement → not computable (n.c.), because the dependent variable has too little variance; *Variant III*: without criterion "paid work" concerning dimension productive social engagement (binary measurement); *Variant IV*: without criterion "paid work" concerning dimension productive social engagement, but with upper third measurement

The results of the multivariate linear regression analyses for subjective measurement of SA are presented in Table 8. Life satisfaction decreases with increasing age and among unmarried individuals but not in those with higher education. Positive experience of ageing is also significantly declining with increasing age while rising with a higher level of education. Affective well-being significantly decreases in older age, but is higher among women and individuals with higher levels of education. Lastly, valuation of life is significantly worse in higher age, for females and unmarried individuals, but better among persons with higher educational attainment. The correlations are in line with the results of the logistic regressions. No unexpected differences to the objective markers of SA are noticeable.

Table 8 Results of Multivariate Linear Regression for Subjective Criteria of SA

VARIABLES	Life Satisfaction	Positive Aging Experience	Affective Well-Being	Valuation of Life
Age groups				
85-89	-0.24* (0.13)	-0.11** (0.06)	-0.12** (0.06)	-0.08** (0.03)
90+	-0.72** (0.15)	-0.22*** (0.07)	-0.28*** (0.07)	-0.22*** (0.03)
Sex (female)	-0.06 (0.12)	-0.01 (0.05)	0.19*** (0.06)	-0.04* (0.03)
Marital status				
widowed	0.06 (0.13)	0.01 (0.06)	-0.01 (0.06)	-0.05* (0.03)
unmarried	-0.49* (0.23)	-0.10 (0.09)	-0.08 (0.10)	-0.12** (0.05)
Education				
medium	0.16 (0.15)	0.11* (0.06)	0.21*** (0.07)	0.08** (0.04)
High	0.33* (0.19)	0.28*** (0.08)	0.48*** (0.09)	0.14*** (0.04)
Constant	7.87*** (0.16)	3.16*** (0.07)	3.09*** (0.09)	1.59*** (0.04)
Observations	1,658	1,658	1,658	1,658
R^2	0.02	0.02	0.05	0.07

Note: coefficients, person calibration weights & clustering, standard errors in parentheses, *** p<0.001, p<0.05**, p<0.01

2.5 Conclusion

The main focus of this study was to investigate SA empirically with a holistic view on objective and subjective markers among the oldest old, a mostly unexplored age segment so far. Distributions of different variants of operationalizations were calculated in order to critically evaluate definitions of SA. It became clear that it is necessary applying different markers of success to very old individuals in comparison to younger age groups, e.g., concerning productive social outcomes.

According to empirical tests of the standard definition of Rowe & Kahn (1997), 9 % age successfully and only 2 % pathologically. The distribution of the successful agers in the oldest old is comparable with the prevalence of successfully ageing people (85+) in the Netherlands (von Faber et al. 2001). The finding is also in line with an assumption of a lower rate (<12 %) compared to the third age (see 2.2.2) and meets the a priori criterion of 10 % successful agers

of a normal distribution. Furthermore, four to five criteria are fulfilled by a third. With regard to the dimensions of SA, it can be stated that most respondents report interpersonal and productive participation in social life despite a high burden of disease and cognitive as well as physical impairments. Nevertheless, multimorbidity and functional impairment pose a risk for the preservation of social contacts and societal contribution.

The logistic regression analyses show that younger age and higher educational attainment significantly increase the probability of SA, whereas sex and marital status are no significant correlates. This is in line with the results of the linear regression analyses (see Table 8) and mostly in line with the results of SA correlates by (Thoma et al. 2020). However, the high values of subjective ratings reveal a remarkable discrepancy compared to objective criteria (see 2.4.1). The cross-tabulation of measurement modes confirms this assumption, too (see Table 6).

2.5.1 Discussion

Staying healthy, living autonomously and leading a productive life may be unrealistic goals in the oldest old (Ribeiro & Araújo 2019). These dimensions proposed by Rowe and Kahn (1997) should be complemented by markers that holistically represent the value perception.

In view of that, a global SA indicator that is oriented by the development of the new Active Ageing-Well Being Index (Fritzell et al. 2020) might be useful. This index examined trends and inequality in a case study of the Swedish Panel Study of Living Conditions (75+). Using analogies of this development can contribute to a discussion on a global indicator to explain inequalities of ageing processes. This indicator needs to weight objective and subjective criteria according to theoretical and empirical foundations. It should be considered whether results are based on subjectively assessed SA processes or whether it is more appropriate to measure the processes objectively through reduced social costs or decreased number of relatives in need of care.

Nonetheless, success is based on personality factors and the resilience to better adapt to life's challenges as proposed by Pocnet et al. (2020). They underscore new prevention approaches with focus on inter- and intraindividual differences. Additionally, Calasanti und King (2020) advocate for a paradigm towards highlighting the role of personal choice and the need for normalizing old ages, likewise to react on accumulated inequality. It could be worth promoting strategies of adaptability to increase the possibilities to thrive in old age. Further research would contribute to a basis for intervention studies to support ageing processes as

early as possible in the life-course. For instance, if one goal is to understand the needs required to support our current population of the oldest old, it should be concerned how many are able to be independent.

Finally, terms of "successfulness" of ageing in political or societal contexts should only be used critically. Nevertheless, the advantage of *successful* ageing prevails as a discourse catalyst of discussions about improvements in living conditions and quality of life of the oldest old.

2.5.2 Strengths and Limitations

Considering the high average age of this study, the response rate of 23% is very good compared to 27% reached in the German Ageing Survey (Klaus et al. 2017). Due to lack of data for the oldest old up to now, these analyses constitute a major contribution to gaining insights into their quality of life.

However, this study has certain limitations. Although the focus was to establish an operationalization for SA that responds to previous criticism, the final choice of measurements may influence estimates and relationships. Additional, in particular longitudinal data, are needed to provide a more solid basis to examine ageing as a process.

With regard to operationalization decisions, the dimension of productive social commitment was the greatest challenge, e.g., regarding association membership. It only indicates whether individuals are members of an association, but not their actual activity as members. Voluntary work, like paid work, is rather rare among the respondents (13%). The benchmark for this criterion remains unclear.

The discrepancy of objective and subjective indicators of SA can be explained by adaptation processes of ageing. Ribeiro und Araújo (2019) have defined success in the longevity by a scope review. They concluded a need for more constructs that include psychological aspects of adaptation. Unfortunately, indicators measuring adaptation mechanism that are acquired over the life course have not been examined. Future studies should test the successful life conduct by Wagner et al. (2018b) as alternative method.

2.6 Appendix

Table 9 Operationalization and Distribution of Single Index Variables of Variant I

SA-Domains	Final operationalization NRW80+ (Wagner et al. 2018b)
absence of disease	**Not having** - coronary heart disease (93 %) - cardiac insufficiency (65 %) - stroke (92 %) - chronic obstructive pulmonary disease (COPD) (87 %) - cancer (excluding skin) (92 %) - diabetes (84 %) - Parkinson's (90 %) - absence of depression (73 %)
high physical function	**Independence in 14 ADLs/IADLs** (2 = no help, 1 = a little help, 0 = only with help) - help with eating (M: 1.9, SD: 0.01) - help with dressing and undressing (M: 1.7, SD: 0.02) - help with body care (M: 1.6, SD: 0.02) - help with walking (M: 1.3, SD: 0.02) - help with getting up from bed and lying down (M: 1.8, SD: 0.02) - bathing or showering (M: 1.4, SD: 0.02) - reaching the toilet in time (M: 1.8, SD: 0.01) - using the phone (M: 1.8, SD: 0.01) - organize routes outside the running range (M: 1.4, SD: 0.02) - buy food and clothing yourself (M: 1.3, SD: 0.02) - preparing your own meals (M: 1.4, SD: 0.02) - do housework (M: 1.1, SD: 0.02) - medication (M: 1.5, SD: 0.02) - settlement of financial matters (M: 1.3, SD: 0.02)
high cognitive function	**Results from Demtect** - normal (74 %) - mild cognitive impairment (16 %) - kind of dementia (1 %) **Estimates of persons unable to provide information** - no cognitive decline (10 %) - very low cognitive memory loss (9 %) - low cognitive losses (7 %) - moderate cognitive decline (12 %) - moderate severe cognitive decline (23 %) - severe cognitive decline (30 %) - very severe cognitive decline (9 %)
high interpersonal social engagement	**Social activity** - Sports (47 %) - coffee party (47 %) - concert, theatre, museum (29 %) - artistic activity (20 %) - further training (9 %) **Social contact** (frequency) - never (0.9 %)

	- seldom (14%) - sometimes (26%) - frequently (43%) - very common (16%) **Living with others** (56%)
high productive social engagement	- paid work (3%) - volunteering (13%) - supporting others (49%) • helped with tasks or accomplishments of others (never: 51%, seldom: 13%, sometimes: 18%, frequently: 14%, very common: 4%) • comforted (never: 25%, seldom: 19 %, sometimes: 31 %, frequently: 21%, very common: 3%) - association membership (25%)

Note: weighted data

Table 10 Inter-relationships among the Five Dimensions of SA

SA Criteria	SA-I	SA-II	SA-III	SA-IV	SA-V
SA-I	-				
SA-II	0.2***	-			
SA-III	0.1***	0.3***	-		
SA-IV	0.04*	0.1***	0.1*	-	
SA-V	0.1***	0.2***	0.3***	0.1***	-

Note: Kendall's tau b, + p<0.10, * p<0.05, ** p<0.01, *** p<0.0; unweighted data, N=1.863

3 Successful Ageing of the Oldest Old is Diverse but Stable: Objectively and Subjectively Measured Evidence from Two Waves of a Population-Based Survey in Germany

Abstract

The number of individuals aged 80 and over is rapidly increasing. Numerous studies have explored concepts of successful ageing (SA) for this ageing group, mostly using cross-sectional data. This study analysed the evolution of objectively and subjectively measured SA criteria through two waves of the representative sample of NRW80+ with N = 912 individuals aged 80 to 102. Multiple linear regressions were used to assess how transitions like becoming widowed or moving into institutional housing settings affect SA over time. Three major results were found: First, both objectively and subjectively measured SA criteria showed a very high degree of stability over time when looking at average levels. Second, this aggregate perspective masked, however, substantial individual-level heterogeneities in subjectively measured SA criteria: In subjective measurements of positive ageing experience, affective well-being and valuation of life, more than half of the oldest old had experienced deteriorations, regarding life satisfaction, there were changes in two-thirds of the sample over time. Third, correlates on SA showed that interpersonal social engagement, life satisfaction and valuation of life decreased significantly with becoming widowed and interpersonal social engagement increased with moving into institutional housing settings. This longitudinal study on the oldest old contributes to the understanding of SA as a diverse process for vulnerable groups who are, for example, affected by transitions in marital status or in terms of housing settings. Therefore, these groups should receive special attention for their needs.

Key Words: Successful ageing, Ageing as process, Subjective well-being, Oldest old, Adaptation strategies

3.1 Introduction

The oldest old require more research due to the rapid growth in their numbers. Globally, their proportion will triple by 2050 to 143 million individuals aged 80 and over (United Nations 2019). In Germany, about one in eight people will be 80 years old or older by 2060 (Statistisches Bundesamt 2019). A recent study about successful ageing (SA) in Germany includes the oldest old (Plugge 2021), but a large body of literature does not differentiate between people aged under or over 80 years (Baker et al. 2009; Bosnes et al. 2017; Hank 2011; McLaughlin et al. 2010). Furthermore, these studies mostly calculate prevalence rates based on cross-sections. Considering the importance of measuring ageing as a human development, the following questions need to be asked: how long can the oldest old maintain ageing successfully, and what characteristics are necessary for stability in the oldest old? These questions are of special interest for the 80+ population, which is characterized by multimorbidity and daily need for care (e.g., Kruse 2017; Smith & Ryan 2016). A systematic review of the subjective definition of SA in individuals aged 75 and over by Badache et al. (2021) reveals that it changes with age-related differences, like contextual factors or being near to death. In particular, challenges such as the onset of the need for care due to health restrictions might influence the SA process of the oldest old rapidly.

The traditional concept of SA proposed by Rowe und Kahn (1997) is well known but it is also, probably, the most criticized model in gerontology to date (Cosco et al. 2014; Katz & Calasanti 2015; Manierre 2018; Martinson & Berridge 2015). It measures SA objectively as the absence of chronic diseases or illness-related impairments while maintaining cognitive and physical functions and an active lifestyle (Rowe & Kahn 1997, 2015). A strong general criticism of Rowe and Kahn's concept (1997) is the lack of subjective measurements of the oldest old themselves (Martinson & Berridge 2015). The scoping review by Teater und Chonody (2020) filled this research gap by summarizing relevant research on the subjective definitions of older adults. Their findings reveal that the SA definition is less strict than is found in the literature.

The differences between theoretical and empirical definitions, as well as between objective and subjective criteria, are, for example, visible in the paradox of well-being (e.g., Mroczek & Spiro 2005; Wettstein et al. 2015). The proportion of objectively and subjectively measured criteria of SA in the oldest old was recently examined with a population-based representative sample of people aged 80 to 102 from the most populous federal state of Germany (Plugge 2021). According to Rowe and Kahn's objective definition, 9 per cent of this sample

aged successfully. One-third (33%) of the sample, of which 11 per cent lived in institutionalized settings, still met four or five SA criteria. Empirical findings revealed a remarkable discrepancy between the objective and subjective criteria of SA in the oldest old. However, these prevalence rates represent only a cross-sectional sample of the oldest old. Consequently, this study should analyse SA with longitudinal data and differentiate between objective and subjective criteria to measure SA holistically.

Examining longitudinal data is valuable and relevant when identifying the problems and challenges of ageing well over time. Longitudinal data has the advantage of comprising both a larger N and the possibility of analyzing time-varying variables (e.g. Wooldridge 2002). Studies on SA over time do exist, but not in Germany. For instance, a longitudinal study of women in Australia (N = 12,432) showed that over one-third of the sample could be considered successful agers in their early 70s, but only a few women could be classified in this category in their later life (Byles et al. 2019). The sixteen-year predictors of SA from a Southern Brazilian cohort aged 60 or older reported that 345 individuals at baseline and 32 (9.3%) participants in the follow-up were classified as successful agers (Rinaldi et al. 2018). The Korean Longitudinal Study of Ageing, with a sample of N = 2,848 aged 60 or older, presented successful ager prevalence rates of 14 per cent for men and 9 per cent for women (Kim et al. 2019). This is similar to the results of longitudinal studies in the United States carried out by McLaughlin et al. (2010) at four different time points. The prevalence of SA for participants aged 65 years was not higher than 12 per cent in any year. Between the four time points, the odds of SA declined by 25 per cent. Longitudinal studies about SA have been carried out in Australia (Byles et al. 2019), Brazil (Rinaldi et al. 2018), Korea (Kim et al. 2019) and the United States (McLaughlin et al. 2010), as well as in other countries. Longitudinal studies about well-being across adulthood in Germany, the UK and the US (e.g. Gerstorf et al. 2010) which do exist indicate that well-being is relatively stable over a long period of time and only declines in late life. However, for Germany, there are no representative results that explicitly refer to SA of the oldest old at different points in time. Conducting these analyses will allow us to ascertain whether SA might be dynamic or stable over time.

'Dynamic' means that young adults turn into older adults, but with cumulative deficits in multiple domains (e.g. Chatterjee 2019). This process can include (critical) life events, e.g., losing a spouse or moving to an institutionalized setting, which are more likely to happen in this age phase. Major life events like these can be turning points for subjective well-being (e.g. Lucas 2007). It is relevant to examine if these events might have a negative effect on SA to understand its development. In a study of a cross-sectional dataset (N = 754) of communi-

ty-living persons aged 70 years or older, 42 per cent identified the death of a family member or a friend as a stressful life event (Hardy et al. 2002). The impact of life events on SA was examined by using longitudinal data from a 10-year follow-up health survey (Hsu 2011). Its results showed that being newly widowed was related to depressive symptoms and that the loss of offspring increased the risk of physical and psychological health and lower life satisfaction. Particularly in the oldest old, the probability of experiencing a critical life event, like widowhood, at the same time as a declining health status could be a critical turning point for SA.

The likelihood of moving to an institutionalized setting increases with age and is often negatively related to outcomes of psychological well-being in old age (e.g., Espirito Santo & Daniel 2018). A systematic review of the relationship between institutionalization and quality of life summarizes that living in an institutionalized setting affects the quality of life of elder participants negatively while being cared for by a family member increases quality of life (Medeiros et al. 2020). For example, the study results of Mulliner et al. (2020) indicate a strong preference for independent living in comparison to institutionalized living settings. The location and the environment are also key drivers of housing preferences. Therefore, it is supposed that moving from a private to an institutionalized setting harms SA. However, diversity is expected in individuals caring for their spouses and suffering from the burden of caregiving (Gérain & Zech 2019). For them, being widowed may also mean improvements in interpersonal or productive social engagement since they now have more free time.

There are supposed to be critical life events that might have a negative effect on the SA of the oldest old, but this age group is also characterized by having sufficient adaptation strategies. This means that the decline is suspected not to be very high due to the oldest old possessing such strategies. These strategies are derived from approaches to the adaptation processes of ageing, e.g., the *selection–optimization–compensation theory* of Baltes und Carstensen (1996) or the *two-process model* of Brandtstädter und Renner (1990). The approaches discuss whether older individuals develop skills for successful adaptation to changes and demands during their life course (e.g., Jopp et al. 2016; Nikitin & Freund 2019). This is in line with the lifespan developmental approach, e.g., by Baltes und Baltes (1990), which argues that development is a lifelong process of balancing between gains and losses. To understand if the oldest old's adaptation strategies might mitigate the role of critical life events in SA, empirical analyses with longitudinal data are required. If changes in SA over time are observable, it is relevant to analyse the characteristics that determine these changes in order to react to the needs of the oldest old as a rapidly growing age group. Another study of SA of

the oldest old will contribute to the current debate on SA, which touches on how the oldest old can thrive in later life. For the first time, transitions in living arrangements and marital status, as well as changes in SA criteria, are examined for the oldest old in more detail. These analyses provide an understanding of how measures of SA change at critical times in life.

Based on this research gap, this paper addresses three specific research questions and hypotheses, as follows.

(I) How do the objective criteria of SA develop over time among the oldest old in Germany? The key contribution of this study to answering this question is to analyse the SA model by Rowe and Kahn (1997), using two waves of a dataset of the oldest old in Germany (NRW80+, N = 912). Due to their increasing health restrictions over time, a decline in the objective criteria of SA is suspected.

(II) How do the subjective criteria of SA develop over time among the oldest old? Examining these criteria will contribute to a more holistic perspective on SA and consider the critique on the lack of its subjective definition. It is expected that the decline concerning subjective criteria is not very high due to the oldest old's adaptation strategies.

(III) What characteristics determine changes in SA outcomes between Wave One and Two in the oldest old? Besides considering characteristics like age, sex and education, there is a special focus on life events, such as becoming widowed or moving into an institutionalized housing setting. These are transitions that might negatively affect changes in SA over time.

3.2 Methods

3.2.1 Sample

The analyses presented here were based on two waves of data collected as part of the representative Survey on Quality of Life and Subjective Well-Being of the Very Old in North Rhine-Westphalia (NRW80+), the most populous federal state of Germany (Wagner et al. 2018b). The data was generated through computer-aided personal interviews and provided demographic information, the economic, social and health status of the participants, and the lifestyle, values and attitudes of individuals aged 80 to 102 years. Moreover, the study included objective screening for mild cognitive impairment. The baseline sample was selected randomly using a multi-stage sampling procedure by drawing 1,863 interviews from the registration offices of 94 municipalities in the state of North Rhine-Westphalia (Hansen et al. 2021). Of Wave One, 1,612 participants agreed to a re-contact; and 237 participants had died since the first interview. Further reasons given for dropout were illness (162), no interest

(90), length of interview (50) and other (161). Therefore, the follow-up sample consisted of 912 interviews. The representativity of this study is due to the coverage of institutionalized respondents and the extensive usage of proxy informants (Wagner et al. 2018b). In Wave One 6 per cent of the interviews and in Wave Two, 10 per cent were conducted with institutionalized respondents (see Table 11). Approximately 3 per cent of the 912 interviews in Wave One and 7 per cent of the interviews in Wave Two comprised proxy interviews with relatives or caregivers acting for individuals who were unable to conduct the 90 min interview themselves due to cognitive or physical health restrictions.

Table 11 Sample Characteristics for Waves One and Two

Characteristics	**W_1 | W_2 %**	**N_1 | N_2**
Age groups		*912*
80–84	46 | 40	415 | 334
85–89	34 | 34	306 | 286
90+	21 | 26	191 | 214
Sex (male)	50	459
Marital status		*912 | 847*
married	41 | 36	374 | 331
widowed	52 | 57	473 | 516
unmarried, divorced, separated	7 | 7	65 | 65
Educational classification		*858*
low	21	178
medium	54	462
high	25	218
Institutionalized	6 | 10	59 | 88
A degree of care	26 | 42	231 | 380

Note: W=wave; low = without any completed vocational training and with a secondary school leaving certificate or lower; medium = completed vocational training or a university entrance qualification; high = a university degree; a degree of care=measured dichotomously; degree one to five vs. no degree; unweighted data from NRW80+, W_1 & W_2 with N=912

The data collection for Wave One took place between August 2017 and February 2018 with a response rate of 23 per cent (Wagner et al. 2018a), which can be considered high concerning the health restrictions imposed on the oldest old and the overrepresentation of nursing home residents. Data collection for Wave Two took place between July 2019 and February 2020. To contrast the relevant subpopulations, oversampling was performed for residents from institutionalized settings, for men and for those in the oldest age segment (aged 90+). The study was approved by the Research Ethics Committee at the University of Cologne (17-169).

3.2.2 Overview of Variables

3.2.2.1 Objective Criteria as Indicators for SA

Traditionally, SA has been investigated based on the definition of Rowe und Kahn (1997), but there is no gold standard definition (Cosco et al. 2014), and different researchers have measured it in a variety of ways. This study used a post-hoc definition by replicating the operationalization of three major recent European ageing studies: the Nord-Trøndelag Health Study (Bosnes et al. 2017), SHARE (Hank 2011) and the West of Scotland Twenty-07 cohort study (Whitley et al. 2018). A construct validity study about the operationalization of SA using confirmatory factor analysis showed the best model fit if the dependent variable included all the dimensions proposed by Rowe and Kahn's concept. It is also recommended that differences between the single dimensions be shown (Kleineidam et al. 2019).

SA was thus realized as a binary indicator that equals 1 if all five dimensions ('absence of disease, 'high physical functioning', 'high cognitive functioning', 'high interpersonal social engagement' and 'high productive social engagement') were fulfilled and 0 if not. The dependent variables consisted of this overall indicator and its individual binary-coded components. The threshold for the binary coding of the global SA indicator was the upper engaged third. This meant that the indicator was not coded with 'yes' or 'no', but was based on the best third (Whitley et al. 2018), which meant two-thirds of the criteria needed to be fulfilled. The decision to use this threshold was derived from the results of comparing SA indicators with different coding schemes in a study by Plugge (2021). The original definition of productive social engagement contains 'gainful employment' as a criterion, but this was excluded for the oldest old since it is very unlikely in this age group. To make the operationalization as transparent as possible, the overall indicator according to its coding scheme is shown in

Table **2**.

Table 12 Overview of Operationalization of Global SA Indicator to Measure Objective Criteria of SA

Global SA indicator	**SA-I** absence of disease	**SA-II** physical functioning	**SA-III** cognitive functioning	**SA-IV** interpersonal social engagement	**SA-V** productive social engagement
Upper engaged a third of all five dimensions	Absence of eight chronic diseases[4] with high prevalence (Diederichs et al. 2011)	14 items on '(instrumental) activities of daily life' (Lawton & Brody 1969) on a 3-step scale from 0 = 'only with help' to 2 = 'no help'	Screening procedure for mild forms of dementia (Kalbe et al. 2005; Kessler et al. 2014) categorized as 'normal', 'mild cognitive impairment' & 'kind of dementia'	Five kinds of social activities (sports; coffee party; concert, theater, museum; artistic activity; further training), frequency of social contacts on a 5-step scale from 1 = 'never' to 5 = 'very common' and living with others	Volunteering, supporting others in tasks or services and give comfort on a 5-step scale from 1 = 'never' to 5 = 'very common' and association membership

Note: For further details about instruments, operationalization and distribution, see Table 9 in the appendix

3.2.2.2 Subjective Criteria as Indicators of SA

Among people aged 80 and over, subjective criteria seem far more valuable in determining success because chronic diseases and the need for care are exceedingly common. For the operationalization of subjective criteria for SA, four measurements of the oldest old's subjective perceptions were conducted (see Table 3). The operationalization was replicated from prior empirical analyses on SA in a cross-sectional study when using the same survey (Plugge 2021). The original references of these constructs are presented in the fifth column of Table 3.

[4] Coronary heart disease, stroke, chronic obstructive pulmonary disease, cancer (skinless), diabetes, Parkinson's disease and depression.

Table 13 Overview of Subjective Criteria as Indicators for SA

Criteria	Derived from	Operationalization	Scale	References
(I) Overall life satisfaction	The challenges and potentials (CHAPO) model including subjective criteria by Wagner et al. (2018b)	General life satisfaction	*10-point scale* from 'very dissatisfied' to 'fully and completely satisfied'	Ryff (1989)
(II) Positive ageing experience	Processes of staying attached or connected to life by Wahl et al. (2012)	Abridged version of awareness of age-related change each subscale with *1.* 'more appreciate relationships and other people', *2.* 'paying more attention to health', *3.* 'more experience to assess things and people', *4.* 'better sense of what's important', *5.* 'freedom to spend days of one's own free will'	*5-step scale* from 1 = 'not at all' to 5 = 'very strong'	Brothers et al. (2016); Kaspar et al. (2019)
(III) Affective well-being	The challenges and potentials (CHAPO) model including subjective criteria by Wagner et al. (2018b)	PANAS short scale with positive feelings experienced in the past 12 months with *1.* 'attentive', *2.* 'joyous', *3.* 'expectant', *4.* 'animated', *5.* 'determined'	*5-step scale* from 1 = 'never' to 5 = 'very often'	Kercher (1992)
(IV) Valuation of life	Conceptual domain 'appreciation of own life' in the challenges and potentials (CHAPO) model by Wagner et al. (2018b)	Average of *1.* 'optimistic', *2.* 'looking forward to many things every day', *3.* 'finding current life useful', *4.* 'life is determined by religious or moral principles', *5.* 'strong will to live', *6.* 'life has a meaning', *7.* 'achieving life's goals', *8.* 'hopeful attitude', *9.* 'making the best of life', *10.* 'finding ideas out of difficult situations', *11.* 'ways to achieve important things', *12.* 'way to solve problems', *13.* 'achieving self-imposed goals'	*3-step scale* from 0 = 'no' and 2 = 'yes'	Lawton et al. (1999)

3.2.2.3 Independent Variables

The statistical analyses were controlled for sociodemographic variables with age, sex and education. Education was separated into the categories ‘low’, ‘medium’ and ‘high’ according to international classification (ISCED). Respondents without any completed vocational training and with a secondary school leaving certificate or lower were categorized as *low*. Individuals with completed vocational training or a university entrance qualification were categorized as *medium*. Respondents with a university degree were categorized as *high.* The variables of (critical) transitions included marital status and the housing setting. First the variable ‘change to widowhood’ describes if a respondent was widowed between Wave One and Wave Two. Second, the variable ‘change to institution’ describes whether a respondent moved from a private to an institutionalized setting between Wave One and Wave Two.

3.2.3 Statistical Analysis

The analyses test the empirical evidence for the assumption that, at different points in time, diverse ways of living affect how ‘good’ life is as perceived by the very old themselves. First, the distribution of successful agers according to objective criteria and their five domains across time were calculated (see Section 2.3.2.1). Besides the development of these criteria in general, the next step covers the question of how ‘dynamic’ the changes were between waves. The changes were created by new dependent variables, which are created by subtracting values from Wave One and Wave Two. The changes in SA are then categorized as ‘improvements’, ‘no changes’ or ‘deteriorations’. Multivariate linear regression analyses were used to assess the independent effects of each variable’s ability to explain SA improvements or deteriorations between Wave One and Wave Two by using objective markers.

Second, the changing rates of the subjective definitions of SA (Section 2.3.2.2) were calculated over time, using the same procedure as for the objective definitions described above. In the overview of these proportions, it must be taken into account that the categories also include minimal deviations from ‘no changes’. Moreover, multivariate linear regression analyses were conducted, with improvements and deteriorations in subjective perceptions as dependent variables. In both regression models, there were independent variables, such as ‘change to widowhood’ and ‘change to institutional housing setting’, acting as transitions between Wave One and Wave Two, and further control variables like age, sex and education were added (Section 3.2.2.3). The last three control variables were used from the First Wave of the survey as gender and education remain constant over time, and age changes only slightly, by a maximum of 1.5 years.

Calibration weights were used to obtain unbiased population estimates by correcting for the disproportional sampling design and survey nonresponse at Wave One (Valliant et al. 2013). The original sample size of 912 respondents was reduced to 688 in the linear regression models regarding the objective criteria of SA, and 845 in the linear regression models regarding the subjective criteria of SA. The loss of 224 respondents in linear regression analyses is related to the screenings of mild cognitive impairment, where a quarter of the respondents were unable to participate due to health restrictions. Statistical significance was set to $p < 0.05$ by analyses using Stata (version 16).

3.3 Results

3.3.1 Bivariate Analyses of Objective Criteria for SA

The distribution of SA according to objective criteria in both waves is presented in Table 4. The global SA indicator displays that, in Wave One, 4 per cent of participants aged successfully (which means that all five criteria were met), while 12 per cent did not meet any of the criteria. In between, 89 per cent fulfilled between one and four of the criteria, while one-fifth meet between four and five of the criteria. In Wave Two, 3 per cent aged successfully, 13 per cent did not meet any of the criteria and 84 per cent fulfilled between one and four criteria. Therefore, the distribution of successful agers varied by only one percentage point across the waves. The highest difference concerning compliance with the criteria was seen within the 'four out of five criteria', with six percentage points.

Table 14 Distribution of Objectively Measured Criteria of SA from Wave One to Wave Two in %

Objective measurements of SA in %	**Total**	**Private**	**Institutionalized**
	W_1 | W_2	**W_1 | W_2**	**W_1 | W_2**
Criteria of SA			
SA-I: absence of disease	31 | 31	89 | 80	11 | 20
SA-II: good physical functioning	29 | 18	99 | 99	1 | 1
SA-III: good cognitive functioning	67 | 60	95 | 94	5 | 6
SA-IV: good interpersonal social engagement	69 | 66	85 | 80	15 | 20
SA-V: good productive social engagement	23 | 19	98 | 96	2 | 4
Compliance with the criteria			
no criteria	12 | 13	86 | 90	14 | 10
one out of five	20 | 24	72 | 75	28 | 25
two out of five	26 | 31	85 | 79	15 | 21
three out of five	23 | 20	93 | 90	7 | 10
four out of five	14 | 8	99 | 98	1 | 2
all criteria fulfilled/successful agers	4 | 3	100 | 100	0 | 0

Note: SA global: upper third measurement and without criterion 'paid work' concerning dimension productive social engagement; W = wave; private = private housing setting; institutionalized = institutionalized housing setting; weighted data from NRW80+, W_1 & W_2 with N=912

The biggest difference between Wave One and Wave Two regarding the objective criteria of SA was shown by 11 percentage points in physical functioning and by seven percentage points in cognitive functioning. A decline could be seen in four out of five SA criteria; only the first criterion on the absence of disease remained constant, with a proportion of 31 per cent. A huge difference was seen between private and institutionalized settings and across time through comparisons of successful agers in the dimension of 'absence of disease' (89% vs. 11% in Wave One and 80% vs. 20% in Wave Two). This finding was equal in all five criteria and evident in the compliance with these criteria. There were no individuals living in institutionalized settings who fulfilled all the criteria of successful agers. However, there were increases by five percentage points in interpersonal social engagement and by two percentage points in productive social engagement among respondents living in institutionalized settings.

The distribution of improvements, deteriorations and no changes according to the objective criteria across both waves is presented in Table 15.

Table 15 Deteriorations, No Changes and Improvements in Objectively Measured SA Criteria from Wave One to Wave Two in %

Objective measurements of SA in %	**Deterioration**	**No changes**	**Improvement**
Global SA	3	95	2
Criteria of SA			
SA-I: absence of disease	12	75	13
SA-II: good physical functioning	14	83	3
SA-III: good cognitive functioning	13	82	6
SA-IV: good interpersonal social engagement	13	77	10
SA-V: good productive social engagement	10	84	6

Note: SA global: upper third measurement and without criterion 'paid work' concerning dimension productive social engagement; deterioration means: successful in W_1 changes to unsuccessful in W_2; improvement means: unsuccessful in W_1 changes to successful in W_2; weighted data from NRW80+, W_1 & W_2 with N=912

For the majority of the oldest old, the level of 'success' did not change (95%). The proportion of deterioration from Wave One to Wave Two was almost as large as the proportion of improvement (3% vs. 2%). For the criterion 'absence of disease', there was no change for 75 per cent and the proportion of deterioration was almost as great as that of improvement. For 'good physical functioning', there was no change for 83 per cent and the proportion of deterioration was almost five times as large as that of improvement. For 'good cognitive functioning', there was no change for 82 per cent and the proportion of deterioration was twice as large as that of improvement. For 'good interpersonal social engagement', there was no change for 77 per cent and the proportion of deterioration was only three percentage points

higher than for improvement, and for ‘good productive social engagement’ the proportion of deterioration was four percentage points higher than for improvement. For ‘good productive social engagement’, there was no change for 84 per cent of the oldest old.

3.3.2 Bivariate Analyses of Subjective Criteria for SA

The set of analyses of subjective criteria as indicators for SA across time is presented in Table 16. In both waves, more than three-quarters of the oldest old stated that they were very satisfied with their life overall. There was a reduction of only four percentage points from Wave One to Wave Two. In terms of the proportions of positive ageing experience, only 4 per cent in Wave One and 7 per cent in Wave Two reported a less positive ageing experience. The mean scores of positive affect showed that for both waves, most of the oldest old had experienced positive feelings ‘sometimes’ or ‘often’ in the previous 12 months. The valuation of life scale had a mean score of 1.6 in Wave One vs. 1.5 in Wave Two, which was quite high in both waves on a three-point scale from zero to two.

Table 16 Distribution of Subjectively Measured Criteria of SA from Wave One to Wave Two in % and as Means

Subjective perceptions	**Total** $W_1 \mid W_2$	**Private** $W_1 \mid W_2$	**Institutionalized** $W_1 \mid W_2$
Overall satisfaction with life in %			
very satisfied	83 | 79	94 | 91	6 | 9
somewhat satisfied	14 | 17	87 | 87	13 | 13
dissatisfied	3 | 3	73 | 73	27 |27
Positive ageing experience in %			
very positive	41 | 36	95 | 93	5 |7
positive	54 | 57	90 | 88	10 | 12
less positive	4 | 7	83 | 85	17 | 15
Mean of affective well-being	3.3 | 3.3	3.4 | 3.3	3.0 | 2.9
Mean of valuation of life	1.6 | 1.5	1.6 | 1.6	1.3 | 1.2

Note: Private = private housing setting; institutionalized = institutionalized housing setting; W = wave; scale of ‘positive and negative ageing experience’ from 1 = ‘not at all’ to 5= ‘very strong’; scale of ‘affective well-being’ from 1 = ‘never’ to 5 = ‘very often’; scale of ‘valuation of life’ from 0 = ‘no’ to 2 = ‘yes’; weighted data from NRW80+, W_1 & W_2 with N=912

Comparisons between private and institutionalized settings showed significant differences from the averages in the second column: 6 per cent of institutionalized residents were very satisfied with their lives in Wave One and 9 per cent in Wave Two. Furthermore, 5 per cent of institutionalized residents had positive experiences in Wave One and only 7 per cent in Wave Two. The mean values of affective well-being and the valuation of life were lower in institutionalized settings than among the oldest old who lived in private housing settings. Counterintuitively, there were small improvements among the respondents living in institutions: 9 per cent of this group in Wave Two vs. 6 per cent in Wave One were very satisfied,

and 7 per cent of this group in Wave Two vs. 5 per cent in Wave One reported a very positive ageing experience.

The distribution of improvements, deteriorations and no changes according to subjective criteria across both waves is presented in Table 17.

Table 17 Deteriorations, No Changes and Improvements in Subjectively Measured SA Criteria from Wave One to Wave Two in %

Subjective measurements of SA in %	Deterioration	No changes	Improvement
Overall satisfaction with life	39	31	30
Positive ageing experience	56	7	37
Affective well-being	49	10	41
Valuation of life	52	11	36

Note: deterioration means: all negative deviations from 'no changes' between W_1 in W_2; improvement means: all positive deviations from 'no changes' between W_1 in W_2; weighted data from NRW80+, W_1 & W_2 with N=912

In the measurement of life satisfaction, there were changes in two-thirds of the sample, and the proportion of deterioration was slightly greater than that of improvement. In terms of a positive ageing experience, more than half of the oldest old had experienced a deterioration, and slightly more than one-third an improvement. In terms of affective well-being, almost half of the oldest old had experienced a deterioration, but 41 per cent had experienced an improvement. In terms of the measurement of the valuation of life, again, more than half of the oldest old showed a deterioration, and slightly more than one-third an improvement.

3.3.3 Multivariate Analyses of Objective Criteria for SA

The results of the multivariate linear regression analyses regarding improvements and deteriorations on objective criteria of SA from Wave One to Wave Two are presented in Table 18. The regression analysis of improvements in the global objective SA indicator shows no significant results. When analyzing the correlations with the individual dimensions of SA, there were some interesting differences in the global measurement. Improvement in good physical functioning increased significantly with higher age, while improvement in good cognitive functioning decreased significantly. Improvement in good interpersonal social engagement increased significantly for women. Improvement in good physical functioning and in good productive social engagement decreased with a higher level of education. Improvement in good interpersonal social engagement decreased significantly with a change in status to widowhood from Wave One to Wave Two and increased significantly with the change to an institution.

Table 18 Results of Linear Regression Models Regarding Improvements in the Objective Criteria of SA from W_1 to W_2

VARIABLES	**Improvement in global SA**	**Improvement in SA-I:** absence of disease	**Improvement in SA-II:** good physical functioning	**Improvement in SA-III:** good cognitive functioning	**Improvement in SA-IV**: good interpersonal social engagement	**Improvement in SA-V:** good productive social engagement
Age	0.00 (0.00)	0.01 (0.01)	0.01** (0.00)	-0.01* (0.00)	-0.01 (0.00)	-0.00 (0.00)
Sex (female)	-0.00 (0.03)	0.05 (0.05)	0.03 (0.04)	0.02 (0.04)	0.09** (0.04)	-0.02 (0.04)
Education						
medium	-0.02 (0.02)	0.03 (0.06)	-0.03 (0.04)	0.06 (0.06)	-0.04 (0.06)	-0.04 (0.04)
high	-0.05 (0.04)	0.06 (0.07)	-0.14*** (0.05)	0.04 (0.06)	-0.00 (0.07)	-0.10* (0.05)
Change to widowhood	0.01 (0.01)	-0.02 (0.05)	-0.05 (0.07)	-0.09 (0.11)	-0.33*** (0.12)	0.03 (0.10)
Change to institution	-0.02 (0.03)	0.09 (0.14)	0.03 (0.04)	0.02 (0.09)	0.32*** (0.12)	0.22 (0.14)
Constant	-0.02 (0.18)	-0.66 (0.59)	-0.76** (0.30)	0.61 (0.41)	0.51 (0.41)	0.24 (0.28)
Observations	688	688	688	688	688	688
R^2	0.01	0.01	0.03	0.01	0.06	0.02

Note: standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*; weighted data from NRW80+, W1 & W2 with N=688

3.3.4 Multivariate Analyses of Subjective Criteria for SA

The results of the multivariate linear regression models for improvements in the subjective measurement of SA are presented in Table 19. Improvement in life satisfaction and the valuation of life decreased significantly with becoming widowed across the two waves. Regarding the variables of age, sex, education and change to an institution, there were no significant results in improvements in the subjective criteria of SA.

Table 19 Results of Linear Regression Models Regarding Improvements on Subjective Criteria of SA from W_1 to W_2

VARIABLES	Improvement life satisfaction	Improvement positive ageing experience	Improvement affective well-being	Improvement valuation of life
Age	-0.02 (0.02)	-0.02 (0.01)	-0.01 (0.01)	0.00 (0.01)
Sex (female)	0.21 (0.16)	0.02 (0.11)	-0.01 (0.10)	0.05 (0.08)
Education				
medium	0.02 (0.22)	0.04 (0.13)	0.08 (0.12)	0.06 (0.11)
high	0.11 (0.24)	0.09 (0.17)	-0.05 (0.14)	0.00 (0.13)
Change to widowhood	-0.69* (0.40)	0.15 (0.23)	-0.16 (0.22)	-0.34*** (0.16)
Change to institution	-0.00 (0.59)	-0.27 (0.17)	-0.20 (0.26)	0.07 (0.21)
Constant	1.49 (1.66)	1.02 (1.04)	1.17 (1.02)	-0.18 (0.86)
Observations	845	845	845	845
R^2	0.01	0.01	0.01	0.01

Note: standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*; weighted data from NRW80+, W1 & W2 with N=845

3.4 Discussion

This longitudinal study on the oldest old contributes to the understanding of SA as a diverse process for vulnerable groups who are, for example, affected by transitions in marital status or in terms of housing settings. However, concerning objectively measured SA criteria, general stability is observable in the results over time. Based on analyses of the data from the Longitudinal Ageing Study Amsterdam, SA is associated with losses in multiple domains, but in many functions, the decline is quite small (Fagerström & Aartsen 2013). This is confirmed here by the analyses of the single criterion of this study and is also in line with the result of 4 per cent vs. 3 per cent successful agers by the objective definition of SA. For the majority of the sample, the level of ‘success’ remains constant; 3 per cent of the oldest old experience deteriorations; and 2 per cent experience improvements over time.

While for individuals, subjectively measured success often changes concerning the categories of ‘deteriorations’, ‘no changes’ and ‘improvements’ over time, it remains constant when averaged over the full sample. Regarding this dynamic, it should be noted that even slight deviations from ‘no changes’ belong to categorizations of ‘deteriorations’ or ‘improvements’.

However, the general stability in the results of the objective and subjective measurements on SA across the two waves of the representative data set of the oldest old reveals the paradox of subjective well-being (Wettstein et al. 2015). Despite loss experiences that are associated with getting older and losses regarding health, the subjective psychological well-being remains stable across old age (Kunzmann et al. 2000). This is in line with other results where the oldest old score well in subjective criteria, e.g., constructs of subjective well-being (Jopp et al. 2008). In this study, the average of subjective SA criteria decreases slightly over time, but the average is, in contrast to physical or cognitive impairments, still high. This paradox of objective and subjective SA indicators might be explained by the approaches to the adaptation processes of ageing, e.g., the *selection–optimization–compensation theory* according to Baltes und Carstensen (1996) or the *two-process model* according to Brandtstädter und Renner (1990). Older people develop skills for successful adaptation to changes and demands during their life course (Jopp et al. 2016; Nikitin & Freund 2019). It could be assumed that adaptation in later life might be an important part of SA and that this might explain how to deal with critical life transitions. An interesting further research question could be the extent to which adaptation mechanisms play a role as a predictor for SA in the oldest old.

Correlates on SA show that improvements in good interpersonal social engagement, life satisfaction and the valuation of life decrease significantly with becoming widowed (see Table 18 and Table 19). This result is close to the results of the study on SA correlates by Thoma et al. (2020), where being married correlates positively with an overall SA indicator. Furthermore, it is also in line with the evolution of depressive symptoms after being recently widowed (Hsu 2011).

Counterintuitively, there is a small increase of two percentage points in results on good productive social engagement and on the subjective measurements of SA among respondents who move to institutionalized settings (see Table 4 and Table 16). Moreover, good interpersonal social engagement increases significantly with moving from a private housing setting. This group includes more satisfied participants in Wave Two, and those with more positive ageing experiences than in Wave One. These unexpected results might also be explained by the approaches of adaptation strategies, as outlined above. It is possible that home residents adapt well to their new home after a certain period of time by, for example, getting to know a new social circle or having daily contact with professional caregivers. Despite having limited physical or cognitive functions, encounters may be more likely in institutionalized housing settings than in private ones. The radius that becomes smaller with age is possibly compensated for by living in an institution. A further explanation could be social comparison pro-

cesses between home residents, which might lead to greater acceptance of an individual's health status.

Wahl (2020) takes up the topic of adaptation and discusses whether SA is 'possible in principle', 'possible' or 'desirable for all'. Wahl observes an emerging SA imperative that could force individuals to engage as much as possible and as long as possible in maintaining 'youthfulness' and 'agelessness'. The pursuit of such goals is counterproductive and may impede the necessary awareness of and adaptation to age-related changes, thus bringing more costs (such as new pressure) than benefits for older adults, in the long run. The extent to which this is counterproductive and brings more costs than benefits for the oldest old still needs to be researched. In contrast to the costs described here, it might be worthwhile considering SA as a desirable developmental aim, just as – according to Erikson und Erikson (1997) – a life balance can be an important developmental aim.

3.4.1 Strengths and Limitations

The longitudinal section provided a valid snapshot of the oldest old's SA before the start of the COVID-19 pandemic and had the advantage of a consistent survey setting. Due to a lack of data for the oldest old up to now, these longitudinal analyses constitute a major contribution to gaining insights into the participants' quality of life over time.

However, this study has certain limitations. Selective dropout may have occurred and may have led to selection bias; this means that longitudinal findings need to be interpreted carefully (Wolke et al. 2009). However, the research team of the study have estimated a comprehensive and highly age-specific model for predicting the probability of re-participation and have corrected for this factor as much as possible. Furthermore, the effective sample size of the longitudinal data set decreased (effectiveness of weighting = 64%), but this was largely due to compensating for the oversampling of the oldest old (aged 90+) and of men (Brix et al. 2021). Therefore, the potential effects of selective dropout on systematic changes in SA indicators only seem to be minor.

Although the focus was on establishing an operationalization for SA that responds to previous criticism, the final choice of measurements may have influenced estimates and relationships. The stability of objective and subjective indicators of SA can be explained by the adaptation processes of ageing. In a scoping review, Ribeiro und Araújo (2019) defined success in terms of longevity. They concluded that there was a need for more constructs that include the psychological aspects of adaptation. Unfortunately, indicators measuring adaptation mechanisms that have been acquired over the life course cannot be examined with this instrument.

Furthermore, information on health behaviour was missing in the questionnaire, therefore limiting the regression analyses. Regression analyses with fixed effects concerning objective and subjective criteria of SA could not be conducted as there was not enough change between Wave One and Wave Two in variables such as loss of a spouse (52% vs. 57%) or moving to an institutionalized housing setting (6% vs. 10%). The interval between the two waves of the survey was relatively short (about 1.5 years), meaning that we need more waves to be able to validate the results of this study.

The results concerning the group of institutionalized residents have to be considered cautiously as this group represents only a small proportion of the sample. However, the representativity of this sample is explained by interviews in institutionalized settings and proxy informants for individuals who were unable to participate. The dependent variables used here, which represent changes between the two waves, may present validity problems because greater bias may occur when two potential biased variables are subtracted from each other.

3.5 Conclusion

SA in the oldest old is a diverse but stable process in a largely unexplored age segment. The results of the empirical analyses have shown that, in comparison to prevailing negative images of old age, the oldest old are objectively and subjectively measured as stable in ageing successfully, at least over two waves of a population-based survey in Germany. This indicates that those who have made it to old age and are relatively healthy and satisfied will remain so for a certain period of time. For practice with seniors, this means that the challenge is to recognize and strengthen adaptation mechanisms as early as possible to protect this group, particularly during critical life transitions. More knowledge about these strategies could be used in professional care settings for the oldest old or their relatives.

3.6 Appendix

Table 20 Operationalization and Distribution of Single Index Variables of Variant I in Waves 1 and 2

SA-domains	Final operationalization NRW80+ (Wagner et al. 2018b)
Absence of disease	**Not having:** - coronary heart disease (93% vs. 93%) - cardiac insufficiency (65% vs. 60%) - stroke (94% vs. 93%) - chronic obstructive pulmonary disease (88% vs. 89%) - cancer (excluding skin) (93% vs. 91%) - diabetes (84% vs. 83%) - Parkinson's (93% vs. 94%) - absence of depression (77% vs. 77%)
High physical function	**Independence in 14 ADLs | IADLs** (2 = no help, 1 = a little help, 0 = only with help) - help with eating (M: 2.0, SD: 0.01 vs. M:1.9, SD: 0.01) - help with dressing and undressing (M: 1.9, SD: 0.02 vs. M:1.8, SD: 0.02) - help with body care (M: 1.7, SD: 0.02 vs. M:1.6, SD: 0.03) - help with walking (M: 1.5, SD: 0.03 vs. M:1.3, SD: 0.03) - help with getting up from bed and lying down (M: 1.9, SD: 0.01 vs. M: 1.8, SD: 0.02) - bathing or showering (M: 1.6, SD: 0.03 vs. M: 1.4, SD: 0.03) - reaching the toilet in time (M: 1.9, SD: 0.01 vs. M:1.9, SD: 0.02) - using the phone (M: 1.9, SD: 0.01 vs. M:1.8, SD: 0.02) - organizing routes outside the running range (M: 1.6, SD: 0.03 vs. M: 1.4, SD: 0.03) - buying food and clothing yourself (M: 1.5, SD: 0.03 vs. M: 1.3, SD: 0.03) - preparing your own meals (M: 1.6, SD: 0.03 vs. M: 1.4, SD: 0.03) - doing housework (M: 1.3, SD: 0.03 vs. M: 1.0, SD: 0.03) - medication (M: 1.7, SD: 0.03 vs. M: 1.5, SD: 0.03) - settlement of financial matters (M: 1.5, SD: 0.03 vs. M: 1.4, SD: 0.03)
High cognitive function	**Results from Demtect** (Kessler et al. 2012) - normal (78% vs. 74%) - mild cognitive impairment (14% vs. 18%) - kind of dementia (1% vs. 1%) **Estimates of persons unable to provide information** - no cognitive decline (6% vs. 7%) - very low cognitive memory loss (18% vs. 6%) - low cognitive losses (13% vs. 3%) - moderate cognitive decline (15% vs. 14%) - moderate severe cognitive decline (16% vs. 23%) - severe cognitive decline (28% vs. 40%) - very severe cognitive decline (5% vs. 7%)
High interpersonal social engagement	**Social activity** - sports (56% vs. 47%) - coffee party (51% vs. 48%) - concert, theater, museum (37% vs. 32%)

	- artistic activity (22% vs. 16%) - further training (12% vs. 8%) **Social contact** (frequency) - never (0.5% vs. 1%) - seldom (12% vs. 14%) - sometimes (25% vs. 27%) - frequently (48% vs. 44%) - very common (14% vs. 14%) **Living with others** (50% vs. 50%)

High productive social engagement	- paid work (2% vs. 4%)
	- volunteering (17% vs. 13%)
	- supporting others
	  • helped with tasks or accomplishments of others (never: 44% vs. 56%, seldom: 13% vs. 13%, sometimes: 21% vs. 16%, frequently: 17% vs. 12%, very common: 4% vs. 3%)
	  • comforted (never: 20% vs. 22%, seldom: 20% vs. 21%, sometimes: 32% vs. 36%, frequently: 25% vs. 19%, very common: 3% vs. 2%)
	- association membership (31% vs. 25%)

Note: Weighted data from NRW80+, W1 & W2 with N=912

4 The Role of Education in the Oldest Old's 'Successful Life Conduct': Evidence from a Population-Based Survey in Germany

Abstract

Research on successful ageing (SA) of the oldest old needs a conceptual framework that considers the special needs of this age group. Some criteria for alternatives to classical SA frameworks are accounted for in the CHAPO model (the Challenges and Potentials Model of Quality of Life). This includes 'successful life conduct' (SLC) with *objective* indicators, e.g. functional quality of life, and *subjective* indicators, e.g. social embeddedness, anomy, valuation of life, and a positive ageing experience. A revision of a classical SA framework should consider structural inequalities. Education is a central determinant of inequalities as it is central to a person's social position. However, it has not been analysed whether education plays a role in the SLC of the oldest old. To answer this question, we were interested in the traces of education and in resources that might mediate this relationship, like *material*, e.g., wealth; *behavioural*, e.g., health literacy or *psychological* resources, e.g., internal control belief.

We constructed general structural equation models of education, mediating resources, and SLC using a representative cross-sectional data set of the oldest old in North Rhine-Westphalia (NRW80+, N=1,863). We could not find a general educational gradient concerning the indicators of SLC. Only for the objective indicators with higher effect sizes do we still assume that education could be a relevant resource for SLC. An educational gradient might be valid, especially for health markers, but less crucial for subjective indicators. Concerning the mediators, we found that material, behavioural and psychological resources had significant indirect effects, though this was not the case with substantial effect sizes. We conclude from this study that it is worth developing resources like education because they enhance the SLC of the oldest old, but there might be further unexplored inequalities that predict SLC more precisely.

Keywords: Successful ageing, oldest old, educational inequalities, wealth, health literacy, internal control belief, general structural equation models, quality of life

4.1 Introduction

Calasanti und King (2020) emphasized that socioeconomic status determines at a very early stage of life whether individuals can thrive optimally in the oldest old. Therefore, they stressed the need to focus on inequalities concerning successful ageing (SA). The classical concept of successful ageing by Rowe and Kahn (1997) is still the most influential but also the most criticised concept of gerontology (e.g., Cosco et al. 2014; Martinson & Berridge 2015). It describes SA as the absence of chronic diseases or illness-related impairments while maintaining cognitive and physical functions and an active lifestyle (Rowe & Kahn, 1997).

A review of the critical literature on SA by Martinson und Berridge (2015) gave rise to the alternative concept of 'successful life conduct' (SLC) in CHAPO (The Challenges and Potentials Model of Quality of Life) by Wagner et al. (2018b). This measurement has several advantages compared to classical measurements of SA, such as its holistic approach and specialisation concerning the characteristics of the oldest old. For a less normative and stigmatising SA framework, these criteria need to be improved and are accounted for in the novel and representative NRW80+ study about subjective well-being and quality of life (conducted in the federal state of North Rhein-Westphalia in Germany), which is mainly based on the CHAPO framework. A revision of a classical SA concept should avoid assumptions that blame the individual and neglect the structural inequalities and societal conditions of ageing (e.g., Calasanti & King 2020; Tesch-Römer et al. 2022). Education is one of the most significant factors of societal inequalities as it is a central determinant of a person's social position. Many other inequality factors that are accumulated or fade out later in the life course depend on an individual's educational status (Kerckhoff 1995; Spring 1977). Educational inequalities regarding the SLC of the CHAPO framework may have accumulated or faded out in the oldest old as well. Therefore, for the oldest old, the question is whether educational differences in outcomes still exist (Kye et al. 2014), or whether they are already erased by a selective group that reaches the oldest old despite increasing health restrictions (Hoffmann 2011). This research question can only now be answered in the German context with the data of the NRW80+ study as it is the first representative study that has been conducted among the oldest old. The population of the oldest old is potentially characterised by frailty (e.g., Fried et al. 2001) and the need for care (e.g., Smith & Ryan 2016). Thus, research on the oldest old needs a conceptual framework that considers the particular needs of this group beyond biomedical indicators.

Based on these considerations, the research question is: *Can educational differences be observed in the SLC of the oldest old?* Therefore, analysis will be conducted on the SLC of the CHAPO framework as an alternative to SA, specially tailored to the oldest old. Moreover, we will analyse the neglected inequality dimension by discussing the role of education in the SLC of the oldest old.

For the latter, we derived three possible mediators based on research strands by Ross und Wu (1995, 1996), who analysed mediators of education and health empirically. Searching for mediators concerning SA was also an aim in the literature review on inhibitors and facilitators by Badache et al. (2021). We were not only interested in whether the traces of education can still be observed in very old age, but in whether the relationship between education and SLC can be explained by *material*, e.g., wealth (Lynch 2003; Ross & Wu 1996), *behavioural*, e.g., health literacy (Chesser et al. 2016; Cutilli 2007), and *psychological* resources, e.g., internal control belief (Mirowsky & Ross 2007).

As ageing is a process that is strongly determined by the structural positions and resources shaping cumulative advantages and disadvantages over the life course, two prominent hypotheses built the basis of our analyses. 1) The 'cumulative (dis)advantage hypothesis' identifies education as one key indicator that structures the unequal distribution of resources and capabilities (e.g., occupation, income, housing conditions, wealth) that leads to unequal outcomes (e.g., in health or quality of life) in later life (e.g., Ross & Wu 1996; Willson et al. 2007). Furthermore, education provides psychological resources (e.g., internal control belief) to cope with stressors or to use new knowledge (e.g., health literacy) to deal with illness or disability. 2) Conversely, the 'age-as-leveler hypothesis' posits that the relationship between education and health weakens instead of strengthens with age (Dannefer 2003; Dupre 2007). On this matter, Hoffmann (2011) highlights that these observed inequalities in levels of education are due to illnesses and biological processes that become more important in old age.

The remainder of this article is structured as follows: first, we explore why SLC of CHAPO is a suitable alternative to classical SA; second, we elaborate on the empirical research state on education and SLC, and third, we derive potential mediators theoretically and empirically.

4.2 (Dis)advantages of Education as a Prerequisite for SLC and the Role of Potential Mediating Resources for the Oldest Old

4.2.1 SLC in the CHAPO Framework as an Alternative to Classical SA Measurement

The CHAPO framework by Wagner et al. (2018b) differentiates five areas: environmental conditions, personal conditions, life chances, life results, and SLC, with constructs of functional quality of life, coherence, generativity, and social embeddedness. In this paper, SLC was considered as the alternative to the framework by Rowe and Kahn (1997) as it incorporates the main critique on classical SA. Firstly, it contains both subjective and objective criteria deliberately designed to cover the quality of life of the oldest old theoretically. Secondly, besides classic objective indicators such as functional quality of life, it emphasises person-environment constellations with constructs such as social embeddedness, anomy, valuation of life, and a positive ageing experience. Current definitions for "(un)successful" ageing emphasised environmental factors as well, which may influence the ability of the oldest old to thrive (Badache et al. 2021). The advantages of using these five constructs are that the subjective perspective (e.g., in the construct of valuation of life), personal interaction with the environment (e.g., in the construct of anomy), and structural inequalities or discrimination structures (e.g., in the construct of positive or negative ageing experience) can be focused on. However, as the single constructs of SLC are the main components of a SA framework, they are more accurate independent indicators than an aggregated successful life index based on Rowe's and Kahn's (1997) SA concept. We have several reasons for this approach. First, we keep the metric nature of the scales and analyse the entire distribution of objective and subjective indicators of SLC, especially concerning inequality, which is neglected in the classical SA concept. This is done to counter further criticism of classical SA measurements as dichotomised indicators with arbitrary thresholds, which classify persons as (un)successful agers (Calasanti 2016). This binary categorisation can lead to stigmatisation due to the simplification of complex ageing processes, and it leads to a loss of variance in the analysis of the SA framework. Second, we assume that the relationship between education (including the role of mediators) and SLC might vary between the different sub-indicators of the concept.

4.2.2 Elaboration on the Research State of Education and SLC

The long-lasting influence of early education on healthy ageing (e.g., Allel et al. 2021; Wagg et al. 2021), physical health (e.g., Leopold 2018), cognitive health (e.g., Bosma et al. 2003; Bravo & Hbert 1997; Lenehan et al. 2015; Lövdén et al. 2020), and mortality (e.g., Halpern-Manners et al. 2020) is well acknowledged in the literature. The relationship between

education and SA has been examined using cross-sectional data of the oldest old (e.g., Plugge 2021), including both cross-sectional and longitudinal data, but not with the alternative concept of SLC by Wagner et al. (2018b) or with resources that might affect this relationship. The analysis of objectively measured SA criteria of the oldest old (80+) in a cross-sectional dataset showed that a higher degree of education significantly correlated with SA (Plugge 2021). Multivariate linear regression analyses for the same sample concerning subjective measurements of SA demonstrated that positive ageing experience, affective well-being, and valuation of life increase significantly with higher educational attainment. Results of a longitudinal study of the effects of early influences and midlife characteristics on SA demonstrated that education as an early identifiable characteristic correlated significantly with SA in a group aged between 50 and 74 years (Pruchno & Wilson-Genderson 2015). Analyses of longitudinal data of individuals aged 65 to 100 years by Cosco et al. (2017) showed that there was a life course link between education and SA indicators, as individuals with higher degrees of SA had significantly higher educational attainment than those with lower SA. This finding was confirmed by a cross-sectional study on the correlates of general versus specific SA components in individuals aged 75 years or older, where more education also correlated positively with the general SA factor (Thoma et al. 2020). Correlates of SA in a population-based cross-sectional sample of older adults aged between 70 and 89 years also found significant correlates between SA and higher education (Bosnes et al. 2017). By contrast, a cross-sectional study of related factors of SA among individuals aged 60 years and above living in nursing homes indicated that education was not related to SA independently (Wu et al. 2017).

These results reveal how important the inequality dimension is, although inequality was not considered in the original conceptualisation of SA. Therefore, we aim to investigate how SLC is structured by educational inequality among the oldest old. Based on the literature about educational advantages for SA outlined above, we assumed an educational gradient concerning SLC.

4.2.3 Selection of Potential Mediators of Education and SLC

Ross und Wu (1995, 1996) and Lynch (2003) provided the theoretical schemes to adopt potential mediators for the relationship between education and SLC as they examined the role of education in health trajectories.

Wealth as the first possible mediator might provide *material* resources to participate in societal structures and facilitate functional health, e.g., access to healthy nutrition, prevention, health literacy, or sports. Wealth could be an important resource; the financial situation was

often mentioned in interviews about perspectives on SA definitions by the older population themselves (e.g., Carr & Weir 2017; Chen et al. 2020; Hörder et al. 2013). A good financial situation is usually determined by an individual's educational level or the educational status of a family (e.g., Chevalier & Lanot 2002). Therefore, we wanted to analyse whether wealth can be a mediator of the association between education and SLC.

Health literacy is a second potential mediator that is supposed to decline in older age (e.g., Baker et al. 2000; Kobayashi et al. 2015) and increase with a higher educational level (e.g., Howard et al. 2006; van der Heide et al. 2013), which partially mediates the relationship between a low level of education and poor self-reported health status (e.g., van der Heide et al. 2013). Education is a prerequisite for health literacy, but the relationship is not endogenous: although education and health literacy correlate with each other, the correlation is not strong. Moreover, health literacy levels are low in the oldest old (Schaeffer et al. 2017). Educational inequality can lead to living conditions that are detrimental for SLC, while at the same time skills like health literacy are unequally distributed when it comes to coping with age-related changes in a changing environment, for example, concerning healthcare progress or triggers such as the COVID-19 pandemic (e.g., Pitts & Freeman 2021). This means that *behavioural* resources like health literacy might be an important mediator due to the unequal distribution of resources.

A third potential mediator of this study is internal control belief as a *psychological* resource, which is thought to decrease from middle age to old age (e.g., Lachman et al. 2011). Few studies have investigated the effect of education on internal control beliefs in old age, with evidence that individuals with a higher educational level have higher control beliefs on average (e.g., Lachman et al. 2011; Mirowsky & Ross 2007). Since internal control belief can also mediate the negative effects of stress, it is thought to be a potential mediator for SLC (Jiménez Ambriz et al. 2012). Moreover, individuals with high control beliefs may use coping strategies more efficiently (Jopp & Schmitt 2010).

In our forthcoming empirical analyses on the role of education, we aim first of all to establish descriptive analyses with mean value comparisons of indicators of SCL in relation to education. Second, we analyse the direct, indirect (mediated), and total effects of education on SLC using general structural equation models (GSEMs).

4.3 Methods

4.3.1 Data

We used the first wave of data collection from the representative German survey on quality of life and subjective well-being of the very old in the state of North Rhine-Westphalia (NRW80+) to conduct analyses about inequalities in the SLC of the oldest old in the most populous federal state in Germany (Wagner et al. 2018b). Despite a lack of a definition that is uniform and cross-disciplinary, the categorisation of the oldest old with a minimum age of 80 years and over, in contrast to 60 years and over, serves as an orientation for research and practice (Baltes & Smith 2003; Kruse 2017). The NRW80+ database provides information on the demographics, economic, social and health status, lifestyle, and values and attitudes of individuals aged 80 to 102 years.

The study was approved by the Research Ethics Committee at the University of Cologne (17–169). Data collection took place between August 2017 and February 2018 (Wagner et al. 2018b). The sample consisted of 1,863 computer-assisted personal interviews drawn from registration offices of 94 municipalities in North Rhine-Westphalia. Approximately 10 per cent constituted proxy interviews with relatives or caregivers for individuals who were unable to participate and 11 per cent of the interviews were conducted with institutionalised respondents. To contrast the relevant subpopulations, oversampling was performed for individuals from institutionalised settings, men, and individuals in the oldest age segment (aged 90+).

4.3.2 Variables

4.3.2.1 Education and SLC

Education as an independent variable was separated into the categories ‘low’, ‘medium’, and ‘high’ according to international classification (ISCED). This classification is increasingly used for the measurement of educational attainment in cross-national surveys (Schneider 2013; Schröder & Ganzeboom 2014). *Low* includes respondents without any completed vocational training and with a secondary school leaving certificate or lower. The category of *medium* education comprises individuals with completed vocational training or a university entrance qualification. A *high* level includes respondents who have completed their studies. For the NRW80+ sample, the distribution of education is as follows: more than half of respondents have a medium degree of education, little more than one-quarter has a low level of education, and little less than a quarter has a high degree of education.

The concept of SLC devised by Wagner et al. (2018b) contained five indicators measured as sum indices, which included both objective and subjective criteria (see Table 3 for opera-

tionalisation and scale information). *The functional quality of life* (I) as the first component of SLC was measured by activities of daily life covering the physical functionality of an individual. The indicator of *social embeddedness* (II) was operationalised by subjectively measured criteria for interpersonal social engagement. This indicator used information about the frequency of social contact with the four most important individuals in the oldest old's social network. The indicators *anomy* (III) and *valuation of life* (IV) measured person-environment constellations subjectively, as anomy refers to coping, adapting, and orientation skills in a social way of life and valuation of life measures the extent to which the person is attached to his or her present life. *Positive ageing experience* (V) as the final indicator also revealed a person-environment constellation and was an abridged version of awareness of age-related change.

Table 21: Overview of the operationalisation of SLC

Indicators	Operationalisation	Scale	References
(I) Functional quality of life *as an objectively measured criterion for physical functionality*	Sum index of 14 items on '(instrumental) activities of daily life': 1. 'help with eating', 2. 'help with dressing and undressing', 3. 'help with body care', 4. 'help with walking', 5. 'help with getting up from bed and lying down', 6. 'bathing or showering', 7. 'reaching the toilet in time', 8. 'using the phone', 9. 'organising routes outside the running range', 10. 'buying food and clothing yourself', 11. 'preparing your own meals', 12. 'doing housework', 13. 'medication', 14. 'settlement of financial matters'	*three-step scale* from 0 'only with help' to 2 'without help'	Katz et al. (1963); Lawton und Brody (1969); McDowell (2006)
(II) Social embeddedness - frequency *as subjectively measured criterion for interpersonal social engagement*	Nomination of the four most important individuals and their 'frequency of social contact' as a sum index	*string variable; six-step scale* from 1 'daily' to 6 'no contact'	adapted instrument
(III) Anomy *as a subjectively measured person-environment constellation*	Sum index of three items about 1. 'coping with social way of life', 2. 'adapting own values with values of today's society' and 3. 'orientation despite changing society'	*four-step scale* from 1 'does not apply' to 4 'applies'	Gümüs et al. (2004)
(IV) Valuation of life *as subjectively measured person-environment constellation*	Sum index of the average of 1. 'optimistic', 2. 'I look forward to many things every day', 3. 'I find my current life useful', 4. 'My life is determined by religious or moral principles', 5. 'I have a strong will to live', 6. 'My life has a meaning', 7. 'I achieve my life goals', 8. 'I have a hopeful attitude', 9. 'I make the best of life', 10. 'I have ways out of difficult situations', 11. 'I have ways to achieve important things', 12. 'I have ways to solve problems', 13. 'I achieve self-imposed goals'	*three-step scale* from 0 'no' and 2 'yes'	Lawton et al. (1999)
(V) Positive ageing experience *as a subjectively measured person-environment constellation*	Sum index of an abridged version of awareness of age-related change; subscale with 1. 'I appreciate relationships more and other people', 2. 'I pay more attention to health', 3. 'I have more experience to assess things and people', 4. 'I have a better sense of what's important', 5. 'I have freedom to spend days as one wishes'	*5-step scale* from 1 'not strong at all' to 5 'very strong'	Brothers et al. (2016); Kaspar et al. (2019)

4.3.2.2 Potential Mediators, Control Variables, and Distribution of NRW80+ Variables

First, we used *wealth*, drawing on the information of home ownership vs. tenancy, as the classical asset and income variables among a quarter of respondents had a lot of missing values that were not random. The quality of information on income or assets as indicators of wealth was not only problematic due to the high volume of missing data, but also because of systematic bias as individuals with higher income often refuse to answer questions about their income (e.g., Frick & Grabka 2014). By contrast, home ownership was a more valid indicator, as it is the highest ranked asset in OECD countries, even though Germany, with 25 per cent, is at the lower edge of this comparison (Causa et al. 2019). Moreover, concerning these analyses of OECD countries, among owners, older individuals were more often homeowners than younger ones. In addition, older persons underestimate the relevance of home ownership as security to pay for potential costs of institutionalisation (e.g., Spiers et al. 2022). Thus, we decided to use home ownership as the best suitable proxy for wealth. This variable had 10 per cent missing values, mostly for respondents living in institutions, which means that these values were not missing at random and, therefore, not imputable (for further information on decisions about imputations, see Section 4.3.3).

The second potential mediator measured by a sum index was *health literacy*, which contained two items about knowledge of and compliance with behaviour to stay healthy, get healthy again, or strengthen health on a four-step scale from 1 ‘never’ to 4 ‘frequently’. The health literacy construct was operationalised using a proxy as it deviated from original operationalisations (e.g., Sørensen et al. 2012) in the NRW80+ data set.

The third potential mediator covered *internal control belief* and was measured by a sum index of having control of one’s own life and success through effort on a four-step scale from 1 ‘does not apply’ to 4 ‘applies’, using the instrument constructed by Kovaleva et al. (2012). The mediation analyses were controlled for socio-demographic variables, namely age and sex. The distribution of variables used for statistical analyses is presented in Table 22.

Table 22 Overview of the distribution of NRW80+ variables, including indicators of SLC and potential mediators in %, as mean and with N

Variables	**%**	**Mean**	**N**
Demographic			
Age groups		85.5	1,863
80-84	39		728
85-89	34		625
90+	27		510
Sex (male)	50	1.5	927
Marital status		1.7	1,862
married	41		755
widowed	52		969
unmarried/divorced/separated	7		138
Care Situation			
Institutionalised housing setting	11	0.1	195
Degree of care		1.0	1,817
none	65		1,181
one	3		62
two	13		237
three	11		202
four	6		109
five	2		35
Independent Variable of Interest			
Educational classification		1.9	1,783
low	27		474
medium	52		930
high	21		379
Indicators of SLC			
(I) Functional quality of life		1.0	1,863
only with help	22		417
with a little help	50		936
without help	27		510
(II) Frequency of social embeddedness		2.1	1,806
daily	12		222
weekly	62		1113
monthly	20		363
several times a year	2		39
seldom	0		4
no contact	4		65
(III) Anomy		1.8	1,820
does not apply	8		147
does not apply very much	29		523
applies to a certain extent	40		725
applies	23		425

(IV) Valuation of life		1	1,839
no	12		228
neither	76		1,391
yes	12		220
(V) Positive ageing experience		1.8	1,847
not strong at all	8		145
slightly strong	25		470
moderately strong	47		870
strong	19		348
very strong	1		14
Potential Mediators			
(I) Wealth		0.5	1,668
owner	49		813
tenant	51		855
(II) Health literacy		3.4	
never	5		92
seldom	7		117
sometimes	29		521
frequently	59		1,069
(III) Internal control belief		2.1	1,825
does not apply	7		122
does not apply very much	16		286
applies to a certain extent	40		727
applies	38		690

Note: unweighted data with N=1,863

4.3.3 Statistical Analysis, Weighting and Imputation

First, we calculated two descriptive overviews of means on indicators of SLC differentiating the educational levels and the three potential mediators. Second, we conducted mediation analyses with three different mediators using the method of General Structural Equation Modelling (GSEM), as presented in Figure 1. The directions of the arrows in Figure 1 are not intended to imply causality, but merely to illustrate the direction of the analyses conducted here.

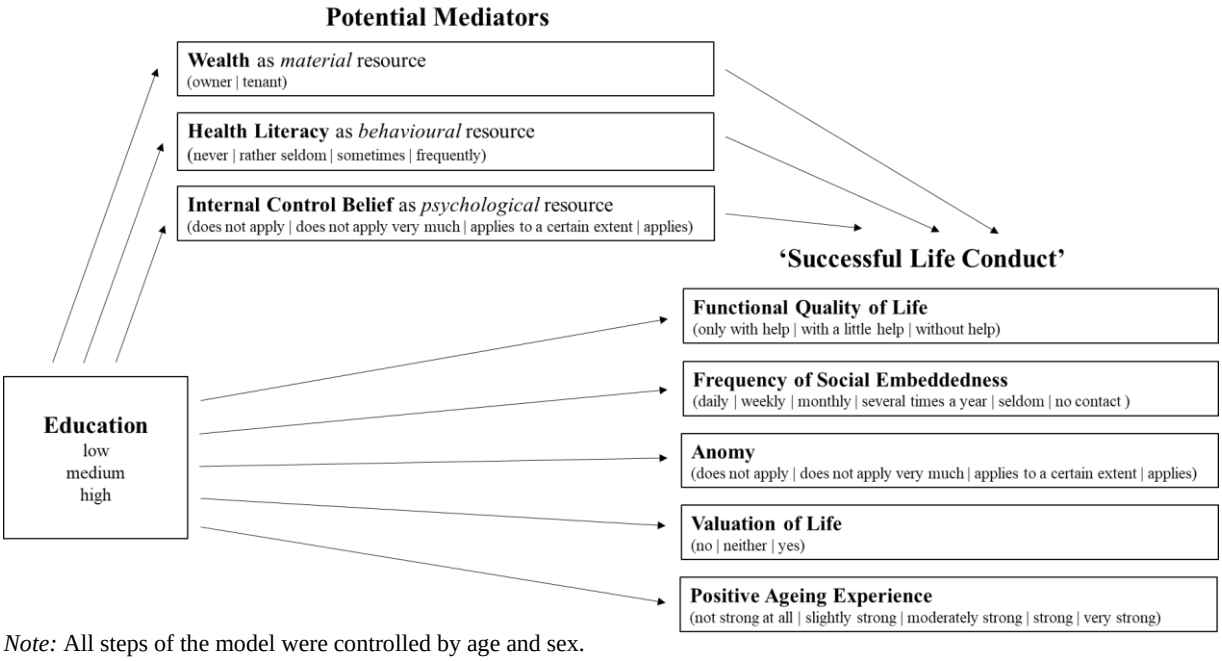
To account for unit nonresponse, the population weight for North Rhine-Westphalia was applied in the descriptive analyses of SLC, the focused variable education, and on the potential mediators. For regression analyses, personal calibration weights were calculated to obtain undistorted estimates. The cluster structure at the municipal level was additionally used for undistorted estimates in the GSEM analyses.

As mentioned in Section 4.3.2.2, 10 per cent of the values were missing concerning the indicator of wealth, mostly concerning the respondents living in an institutionalised housing

setting. This was mainly caused by a filter. If it was obvious that respondents were living in an institution, they would not have been asked if they were homeowners or tenants. We only knew by another questionnaire item that ten out of 211 respondents living in an institution had rental income. Because of this small set of information on institutionalised persons' wealth, we did not impute the 10 per cent missing values.

All other variables used for the analyses have missing values under 4 per cent. As weighting with GSEM including imputation models is not feasible, we decided to leave out imputed values. The original sample size of 1,863 respondents was reduced to 1,482 because of missing values mainly on wealth in GSEM. Concerning the multivariate regression analysis as a robustness check in 4.4.3, the sample size was reduced to 1,638 respondents, of which 10 per cent were respondents living in institutionalised housing settings. Statistical significance was set to $p < 0.05$ by all analyses with Stata (version 16).

Figure 1 Conceptual model of GSEM using wealth, health literacy, and internal control belief as mediators between education and indicators of SLC



Note: All steps of the model were controlled by age and sex.

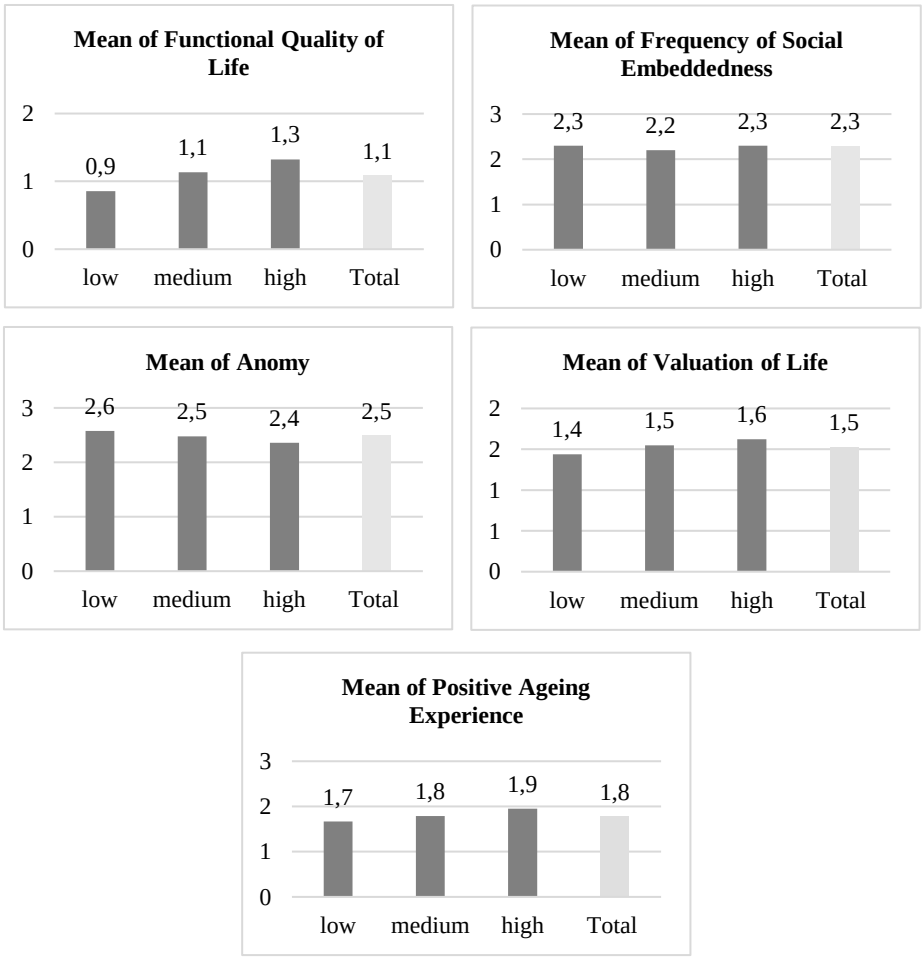
4.4 Empirical Results

4.4.1 Descriptive Analyses of SLC and Potential Mediators Conditional to Different Levels of Education

The results of the descriptive analyses of the five indicators of SLC conditional to education are presented in Figure 2. Regarding the descriptive analyses on subjective indicators of SLC, we could not identify an educational gradient as the outcomes did not differ substantively between the three educational levels. The only exception concerned the functional quality of life as an objective health indicator of SLC. Here we observed at least some difference in

the mean between the lowest and highest educational group. We considered this as a weak but relevant educational gradient from highly to low educated individuals. Concerning the outcomes of the subjective indicators of the SA framework, we could see grades from highly to low educated individuals as well, but these grades had differences of 0.1 scale points, which made them too small to be considered as notable educational gradients. An exception to these subjective indicators was the indicator of social embeddedness, where we could not find grades from highly to low educated individuals.

Figure 2 Means of indicators of SLC conditional to low, medium, and high levels of education



Note: Functional quality of life: 0 ‘only with help’ to 2 ‘without help’; frequency of social embeddedness: 1 ‘daily’ to 6 ‘no contact’; anomy: from 1 ‘does not apply’ to 4 ‘applies’; valuation of life: 0 ‘no’ and 2 ‘yes’; positive ageing experience: 1 ‘not strong at all’ to 5 ‘very strong’; weighted data, NRW80+, N=1,863

When analysing the comparison of means on the five indicators of SLC conditional to education, but concerning the values of the three mediators as well (see Appendix, Figure 6, Figure 7, and Figure 8), there were no notable differences regarding wealth in subjective indicators of SLC (see Figure 6). However, we could observe small differences regarding the means of functional quality of life (e.g. differences between tenants with a low and medium level of education by 0.3 scale points).

For the different values of health literacy conditional to education (see Figure 7), we could not observe substantial differences in the means of social embeddedness and anomy. The patterns of means concerning the functional quality of life, valuation of life, and positive ageing experience were slightly different. For example, for functional quality of life, we found differences by 0.5 scale points between low and medium educational levels in the group with a 'seldom' health literacy score. Concerning means of valuation of life and positive ageing experience, we found differences by 0.3 scale points within the group of 'no/never' health literacy scores between medium and highly educated persons.

For the different values of internal control belief conditional to education (see Figure 8), we could not observe notable differences in the means of social embeddedness. However, for functional quality of life, we found differences by 0.3 scale points between a low and medium level of education in the group with a 'does not apply very much' internal control belief score. Concerning the group of 'does not apply' internal control belief scores, the means of anomy also showed differences by 0.6 scale points between a medium and high level of education. Regarding this internal control belief score, we also found differences by 0.3 scale points between medium and highly educated respondents.

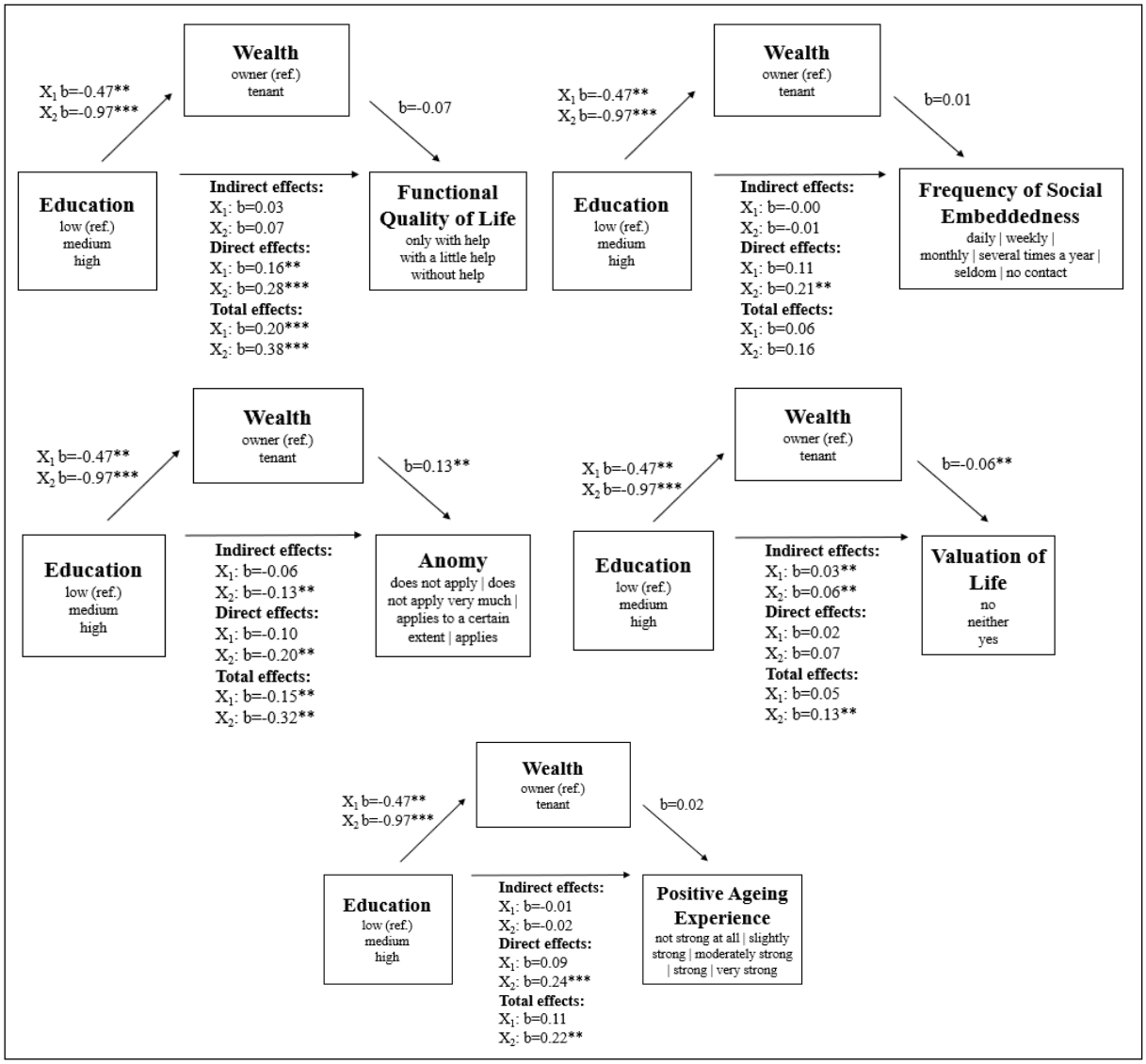
4.4.2 GSEMs of Education, Potential Mediators, and SLC

A general pattern that extended across all GSEM was that a higher level of education correlated significantly with almost all of the indicators of SLC. However, the range of direct effect sizes regarding these relationships was only between $b=0.1$ and $b\leq0.3$ in the GSEM. Hence, no substantial educational gradients in indicators of SLC were found. Instead, we could see within the total effects ($b\geq0.3$) that a high level of education had a substantial effect on functional quality of life, when not controlling for the mediators. For the indirect effects of functional quality of life, we found with $b=0.2$ to $b\leq0.3$ higher significant effect sizes for all three different mediators and concerning a high level of education. A further exception was the relationship between education and social embeddedness, where we found insignificant direct effects but no total effects of education. These results are congruent with the descriptive analyses in Section 4.4.1.

The results in Figure 3 showed that wealth neither mediated the relationship between education and the SLC outcomes nor does it have a substantial independent relationship with the outcomes. The relationship between education and functional quality of life could not be explained by wealth either. Furthermore, the direct effects of education on the indicators of SLC were in most of the models larger than for wealth as the first examined mediator. An excep-

tion is a substantial significant relationship between a high educational level and anomy when not controlling for wealth.

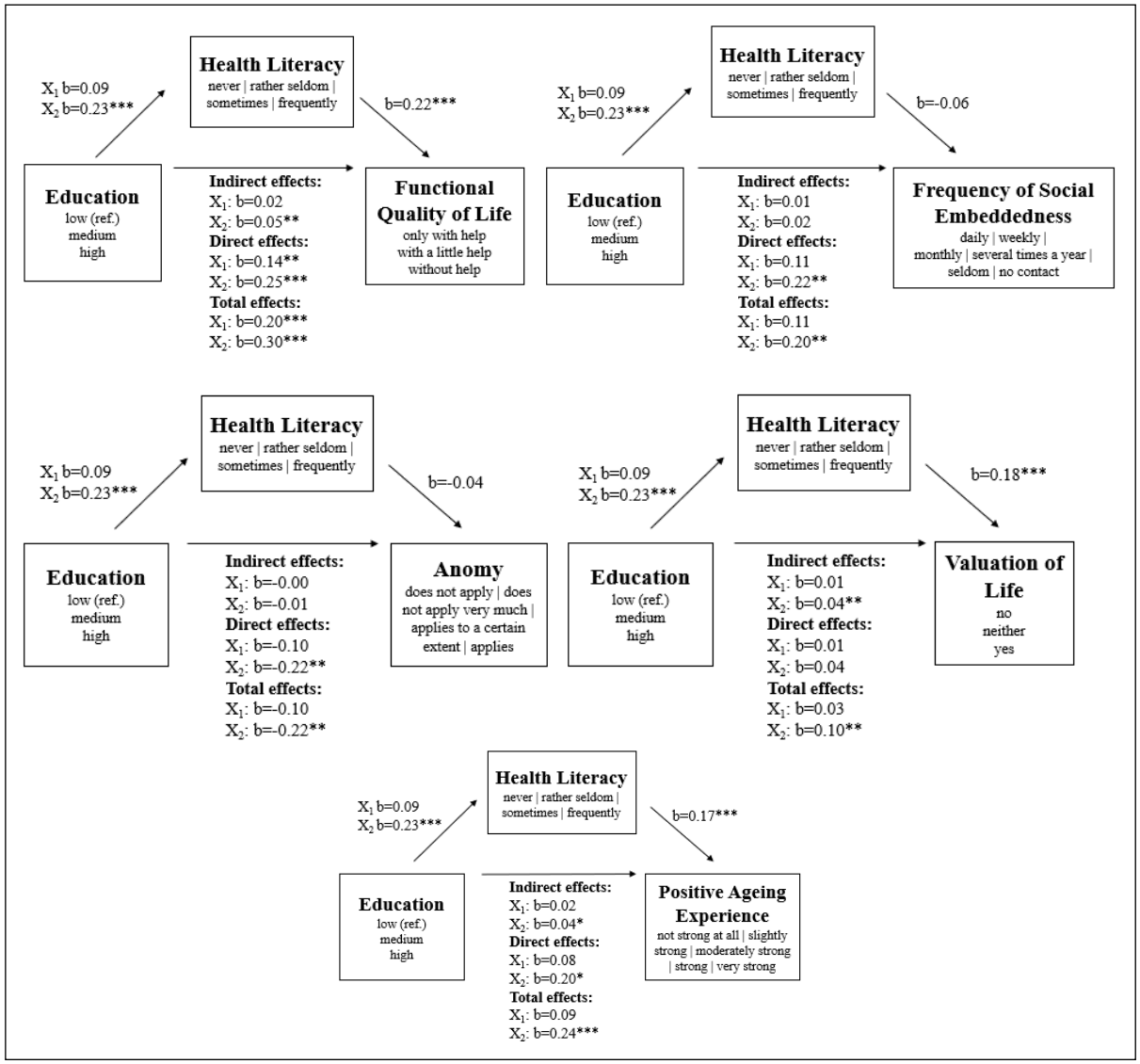
Figure 3 GSEMs for 'wealth' as a mediator between education and indicators of SLC



Note: All models were controlled by age and sex; X_1=medium level of education, X_2=high level of education; Total effect= effect without controlling for the mediator; weighted data from NRW80+, Wave One with N=1,482; for more information on GSEMs, see Table 23 in the Appendix
Significance levels: *** p<0.01, ** p<0.05, * p<0.1*

The second potential mediator was health literacy (see Figure 4). The effect sizes of the direct effects of education on the indicators of SLC were in all of the models larger than for the indirect effects. We observed small indirect effect sizes of health literacy on highly educated persons and functional quality of life (b=0.05***), valuation of life (b=0.04**), and positive ageing experience (b=0.04*). From these results of GSEM, we could see that health literacy did not play a substantial role. Moreover, health literacy did not mediate the relationship of education on social embeddedness and anomy.

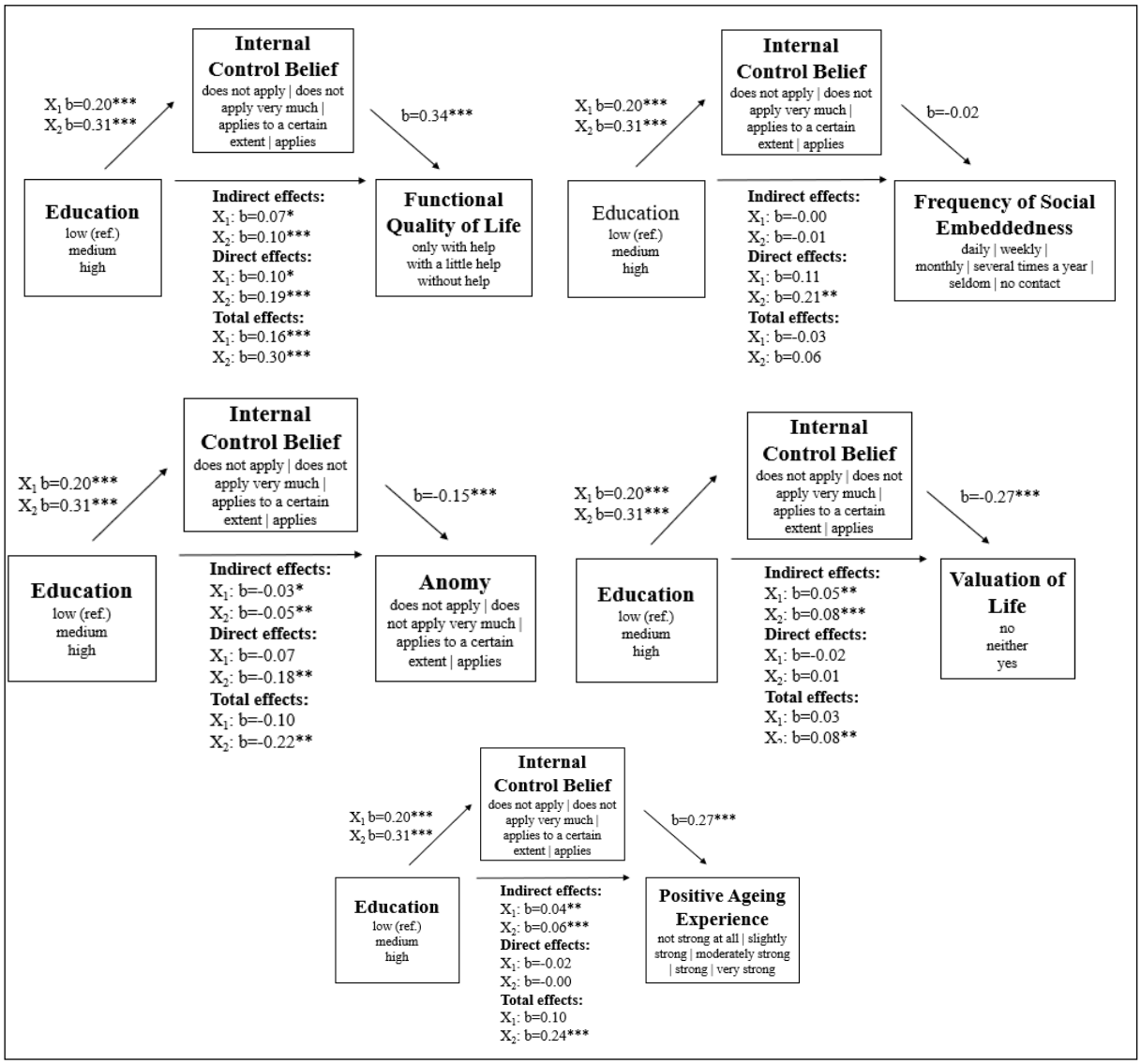
Figure 4 GSEMs for 'health literacy' as a mediator between education and indicators of SLC



Note: All models were controlled by age and sex; X_1=medium level of education, X_2=high level of education; Total effect= effect without controlling for the mediator; weighted data from NRW80+, Wave One with N=1,482; for more information on GSEMs, see Table 24 in the Appendix
Significance levels: *** p<0.01, ** p<0.05, * p<0.1*

The last and third mediator, internal control belief, mediated significantly and partially the relationship of a high level of education on functional quality of life, anomy, valuation of life, and positive ageing experiences (see Figure 5). However, these indirect effects were lower than b=0.1 and, again, not substantial. Moreover, the effect sizes of the direct effects of education on the indicators of SLC were larger than the indirect effects of internal control belief as mediators.

Figure 5 GSEMs for 'internal control belief' between education and indicators of SLC



Note: All models were controlled by age and sex; X_1=medium level of education, X_2=high level of education; Total effect= effect without controlling for the mediator; weighted data from NRW80+, Wave One with N=1,482; for more information on GSEMs, see
Table **25** in the Appendix
Significance levels: *** p<0.01, ** p<0.05, * p<0.1*

4.4.3 Robustness Check of Correlation between Education and Further Objective Health Indicators of SLC

We conducted a sensitivity analysis to test the robustness of our results in Sections 4.4.1 and 4.4.2, where we observed slightly different patterns concerning the levels of education between objective and subjective indicators of SLC. To cross-validate the result of functional quality of life, where we identified a small educational gradient, we calculated a multivariate regression analysis with a further objective health indicator of SLC (see Table 26 in the Appendix). For this aim, we used the degrees of care as a further objective health indicator and compared the regression results with the subjective indicators of SLC. We found an educa-

tional gradient concerning degrees of care (b=-0.56***), which means that a higher educational level was significantly and negatively correlated with a higher degree of care. This result showed that with a lower level of education the care level might increase, which means that the general health situation of the oldest old gets worse and their need for care increases as well. However, we also observed a small positive significant coefficient (b=0.25***) for the correlation between a high level of education and positive ageing experience as a subjective indicator of SLC. Contrary to the results of GSEM, the regression analyses on education and frequency of social embeddedness showed no significant correlations.

4.5 Discussion

Calasanti und King (2020) stressed the need to focus on inequalities concerning SA. They argued that socioeconomic status determines at a very early stage of life whether individuals can thrive optimally in general. Educational differences at a young age can lead to high educational inequalities in the oldest old, which means disadvantageous conditions for individuals with lower degrees of education. On this matter, we first aimed to examine if there are any educational traces in the oldest old's SLC.

Our study results on the total effects of a high level of education on SLC in GSEM were roughly comparable to previous studies of positive associations between higher levels of education and SA (Bosnes et al. 2017; Cosco et al. 2017; Plugge 2021; Thoma et al. 2020). However, when using the classification of threshold values for the social and behavioural sciences, we could only interpret a substantial educational gradient for the objective indicator of functional quality of life, namely 0.2 for a weak, 0.5 for a medium, and 0.8 for a strong relationship (Cohen et al. 2013). Consequently, in contrast to our assumption, we could not find a general educational gradient concerning all indicators of SLC in the oldest old. Only for objective health indicators can we still assume that education is a relevant resource for ageing successfully in the oldest old. This result was cross-validated by analysing the degree of care as a further health indicator for the robustness check in 4.4.3.

There are several theoretical rationales for different significant correlations of education with objective and subjective indicators of SLC. First, in the oldest old, one's subjective evaluation of one's life (e.g. measured by anomy, valuation of life, and positive ageing experience) is far removed from one's educational path because the years of education that we look at in our research mostly take place in the second age. This could mean that education is less effective in the subjective view of life. The role of alternative educational stages in the form of further education or education through a practised profession would be interesting to inves-

tigate as these stages of education are closer to old age than the classical educational paths taken up to the age of about 30.

Second, the significant relationship between education and functional quality of life could be relevant due to the different types of jobs that individuals with low levels of education do, which are more physically demanding than work done by people with higher levels of education. The higher educated individuals are more likely to be healthier by exercising or relaxing in their non-physical work. The kind of jobs and behaviour could leave traces in the physical activity of the oldest old.

Third, the insignificant correlation between education and frequency of social embeddedness was not significant when institutionalised respondents were included in the sample, as the robustness check revealed. This result could be explained by this important group, which was mostly excluded in the GSEM because of missing values on wealth. Education seemed to play less of a role in the social embeddedness of residents of institutionalised housing settings than of the oldest old living in private homes, as daily (social) contacts are guaranteed because of the residents' need for care. Furthermore, social contacts in institutions are randomly mixed according to different educational levels. These assumptions need to be analysed further.

The second aim of our research was to investigate whether the relationship between education and SLC can be explained by material, behavioural and psychological resources measured by the constructs of wealth, health literacy, and internal control beliefs. The results by GSEM were mostly in line with the literature review on inhibitors and facilitators of SA by Badache et al. (2021). As we found quite small significant mediation effects or no effects for the mediators, we still assume that other resources than education are important to thrive optimally, but we also suggest analysing the models with more datasets of the oldest old to validate these results. A somewhat higher significant mediation effect size (b=-0.13*) was found in the effect of wealth and a high degree of education on anomy (see Figure **3**). This means that coping with a social way of life, adapting one's values to today's society, and orientation despite the changing society seemed to be partly mediated more by material than educational resources. Wealth might act as a stabiliser, especially for a constantly changing society. The effect sizes of the other significant mediation analyses were not high and, therefore, not substantial. Furthermore, the direct effects of education on indicators of SLC were at least higher than the effects of mediation analyses.

Concerning the distribution of education in the group of the oldest old, 21 per cent had a high degree of education. The largest group, 52 per cent, had a medium degree, and 27 per

cent had a low degree of education. This means that one-fifth of this age group had a good education and, therefore, a higher likelihood of leading a successful life, especially regarding objective health indicators. Hence, it could be relevant to enable and motivate individuals to reach a high level of education, which is also a societal question of educational structures. Furthermore, it could be interesting to examine other characteristics of inequality like sex, race, or differences in marital status to reduce unequal possibilities to age successfully.

Concerning the two prominent hypotheses of (1) 'cumulative (dis)advantages' and (2) 'age-as-leveler', introduced at the beginning of the study, we cannot support the first hypothesis with our GSEM results, according to which education might be a key factor that determines SLC. Nor can we support the second hypothesis, namely that the relationship between education and health weakens with age or in old age, since the education effect is strongest in our analysis of functional quality of life. For further discussion of these hypotheses, longitudinal analyses over a longer period of old age are needed.

4.5.1 Strengths and Limitations

Concerning the high average age of this study, the response rate of 23 per cent is high compared to the 27 per cent that was reached in the German Ageing Survey (Klaus et al. 2017). This strengthens the study results, especially because of the high average age.

However, this study has certain limitations. We found two limitations in the operationalisation of SLC and the mediator of health literacy. First, generativity is a crucial component of SLC. However, this questionnaire includes only information about the effect of an individual's value system on generativity and does not provide information on the actual generativity performed. In further research, generativity should be included as a developmental psychological dimension to explore SLC more precisely. Second, the proxy for health literacy is not a valid instrument for measuring this construct as it covers only two items about the knowledge of and compliance with behaviour to stay healthy, get healthy again, or strengthen health. As health literacy was significant in some GSEM, although with quite small effect sizes, it should be measured again with a more complete instrument in future research.

Our study was designed to provide an initial explorative overview and not to draw a causal inference. This is needed especially for the relationship between education and objective health measurements for the oldest old, including longitudinal analyses.

Unfortunately, we could not calculate multi-level analyses with this data set and, for example, take environmental factors into account when analysing whether belonging to a specific institutionalising housing setting affects the relationship between education and SLC. Con-

cerning these respondents, we do not have information about their wealth, which means that they were mostly excluded from our GSEM results. This distorts our results on this important group of the oldest old. We suggest conducting our analysis with more institutionalised respondents or omitting the mediator of wealth, as we did in the robustness check of our study, as this was the variable with the most missing values.

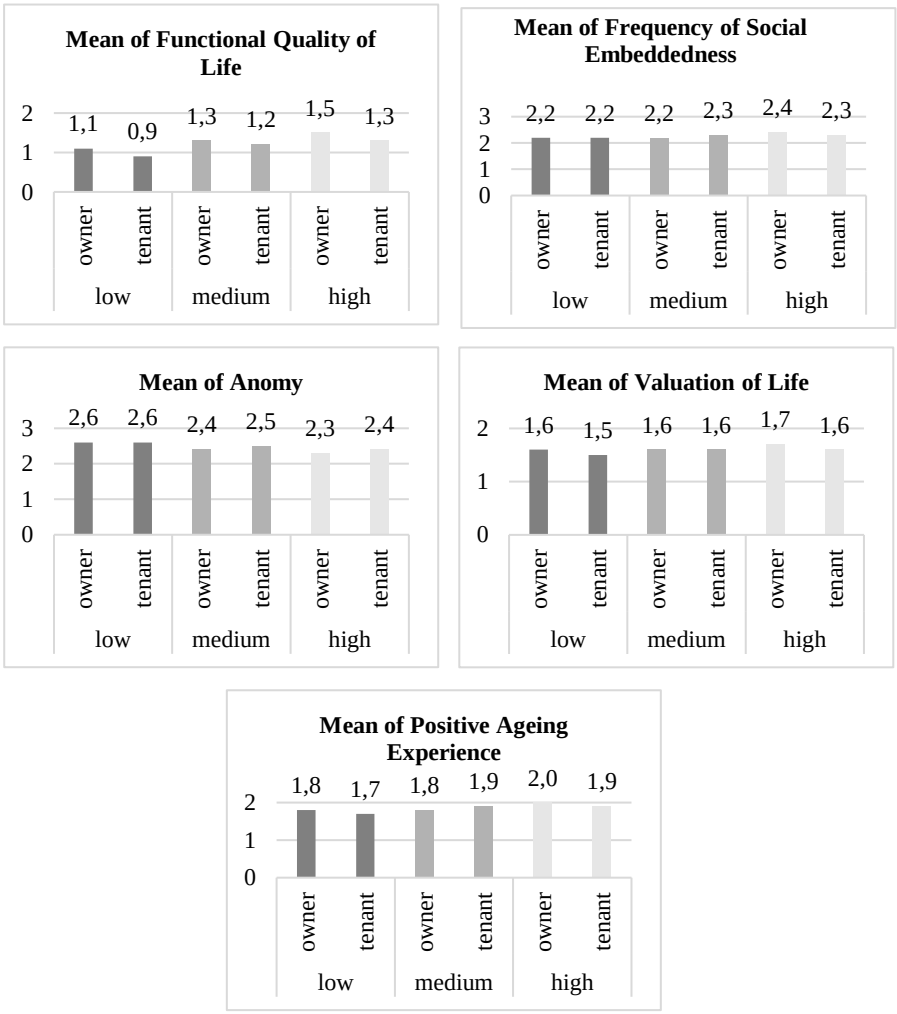
4.6 Conclusion and Practical Implications

The empirical analyses of the relationship between educational inequalities and the SLC of the oldest old contribute to the understanding of an important inequality pattern of SLC and useful resources that reinforce the oldest old's ability to thrive in an ageing society. Education is one of the resources throughout the lifespan that can reduce the inequalities of ageing successfully in the oldest old, but the role of education is not outstanding. Furthermore, there were also significant but not substantial mediators that affect this relationship, as GSEMs of wealth, health literacy, and internal control belief showed. It can be concluded that it is worth investigating the relationship between educational inequalities and health markers of SLC in old age especially. For this aim, it could be useful to examine other criteria where inequality is evident, such as gender or other variables of socioeconomic status. Subjective indicators play a less strong role in explaining inequality outcomes of SLC.

A practical implication from this study is that lifelong education and the development of other resources can enhance SLC, which means that educational inequalities should be addressed as early as possible in the life course. However, such resources should not be the sole focus as other resources may predict differences in the SLC of the oldest old.

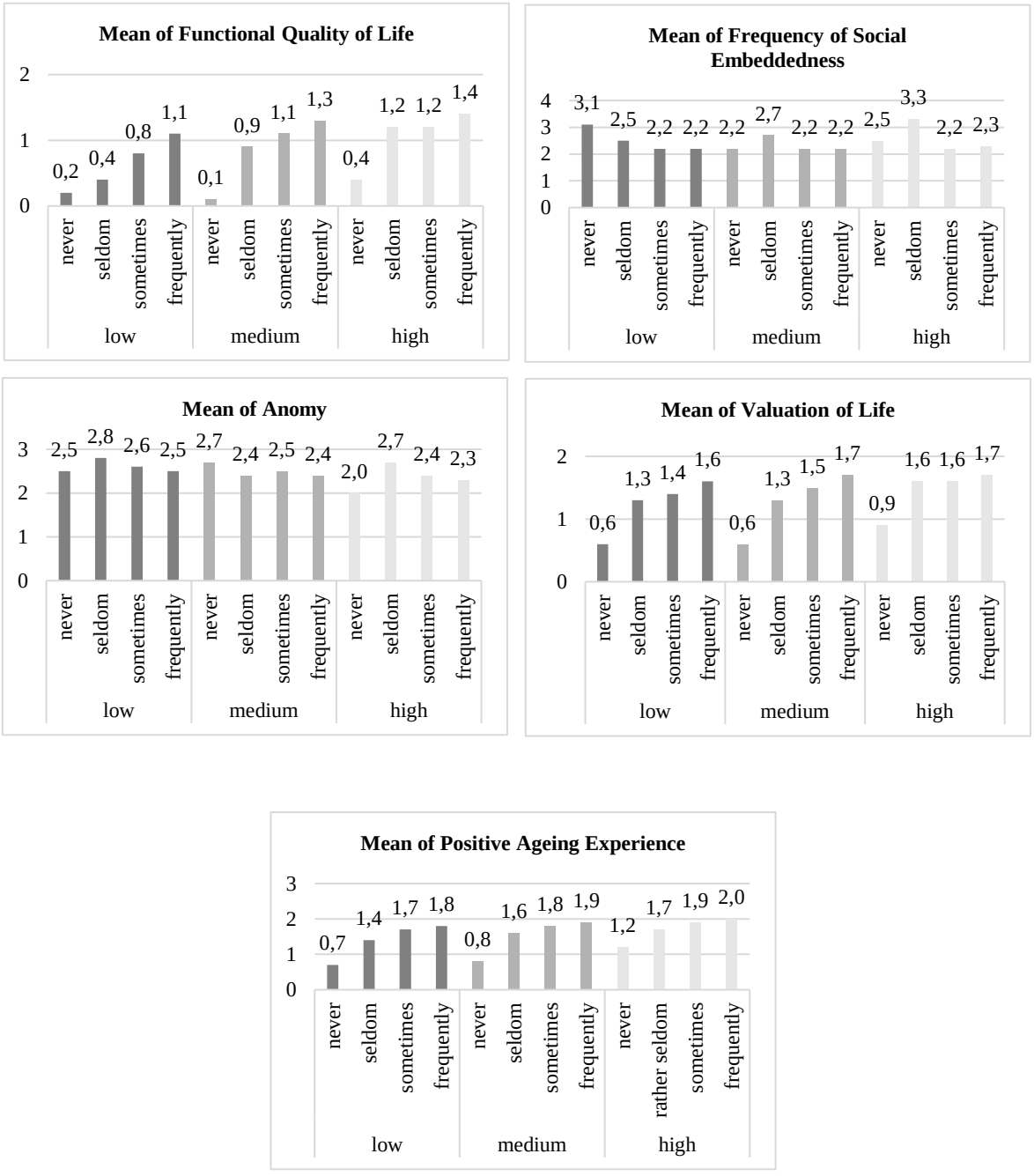
4.7 Appendix

Figure 6 Means of indicators of SLC conditional to low, medium, and high levels of education, differentiated by wealth (categorised as owner and tenant)



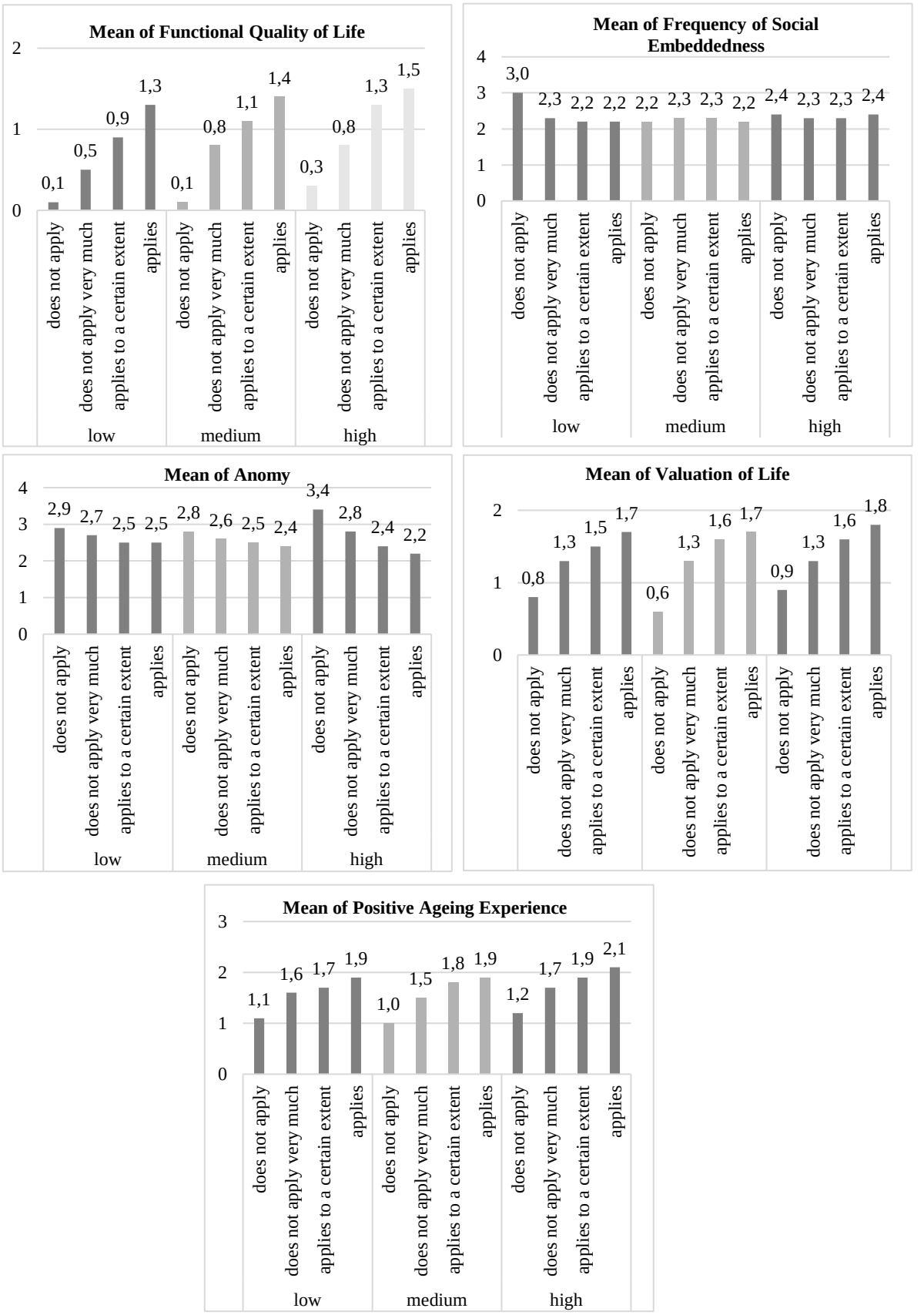
Note: Functional quality of life: 0 ‘only with help’ to 2 ‘without help’; frequency of social embeddedness: 1 ‘daily’ to 6 ‘no contact’; anomy: from 1 ‘does not apply’ to 4 ‘applies’; valuation of life: 0 ‘no’ and 2 ‘yes’; positive ageing experience: 1 ‘not strong at all’ to 5 ‘very strong’; weighted data, NRW80+, N=1,863

Figure 7 Means of indicators of SLC conditional to low, medium, and high levels of education, differentiated by values of health literacy



Note: Functional quality of life: 0 ‘only with help’ to 2 ‘without help’; frequency of social embeddedness: 1 ‘daily’ to 6 ‘no contact’; anomy: from 1 ‘does not apply’ to 4 ‘applies’; valuation of life: 0 ‘no’ and 2 ‘yes’; positive ageing experience: 1 ‘not strong at all’ to 5 ‘very strong’; weighted data, NRW80+, N=1,863

Figure 8 Means of indicators of SLC conditional to low, medium, and high levels of education, differentiated by values of internal control belief



Note: Functional quality of life: 0 'only with help' to 2 'without help'; frequency of social embeddedness: 1 'daily' to 6 'no contact'; anomy: from 1 'does not apply' to 4 'applies'; valuation of life: 0 'no' and 2 'yes'; positive ageing experience: 1 'not strong at all' to 5 'very strong'; weighted data, NRW80+, N=1,863

Table 23 GSEM for Figure 3, including education, wealth as a mediator, indicators of SLC, and the control variables age and sex

VARIABLES	Wealth	Functional Quality of Life (I)	Social Embed-dedness (II)	Anomy (III)	Valuation of Life (IV)	Positive Ageing Experience (V)
Mediator Wealth (Ref. owner)		-0.07 [0.04]	0.01 [0.06]	0.13** [0.05]	-0.06** [0.02]	0.02 [0.05]
Independent Variable of Interest:						
Education (Ref. low)						
medium	-0.47 ** [0.16]					
high	-0.97*** [0.22]					
Indirect effects						
medium		0.03 [0.01]	-0.00 [0.03]	-0.06 [0.03]	0.03** [0.01]	-0.01 [0.02]
high		0.07 [0.04]	-0.01 [0.06]	-0.13** [0.06]	0.06** [0.03]	-0.02 [0.05]
Direct effects						
medium		0.16** [0.04]	0.11 [0.06]	-0.10 [0.07]	0.02 [0.03]	0.09 [0.05]
high		0.28*** [0.06]	0.21** [0.10]	-0.20** [0.08]	0.07 [0.04]	0.24*** [0.03]
Total effects						
medium		0.20*** [0.05]	0.06 [0.07]	-0.15** [0.08]	0.05 [0.03]	0.11 [0.07]
high		0.34*** [0.06]	0.16 [0.13]	-0.32** [0.09]	0.13** [0.05]	0.22** [0.09]
Control variables						
Age	0.03** [0.02]	-0.05*** [0.00]	0.00 [0.01]	0.02** [0.02]	-.01*** [0.00]	-0.01 [0.01]
Sex	0.5*** [0.15]	-0.09** [0.04]	0.02 [0.05]	0.03 [0.05]	-.04* [0.02]	0.03 [0.05]

Note: standard errors in parentheses; weighted data from NRW80+, Wave One with N=1,482
Significance levels: *** p<0.01, ** p<0.05, * p<0.1*

Table 24 GSEM for Figure 4, including education, health literacy as a mediator, indicators of SLC, and the control variables age and sex

VARIABLES	Health Literacy	Functional Quality of Life (I)	Social Embed-dedness (II)	Anomy (III)	Valuation of Life (IV)	Positive Ageing Experience (V)
Mediator Health Literacy		0.22*** [0.03]	-0.06 [0.05]	-0.04 [0.05]	0.18*** [0.02]	0.17*** [0.05]
Independent Variable of Interest:						
Education (Ref. low)						
medium	0.09 [0.05]					
high	0.23*** [0.07]					
Indirect effects						
medium		0.02 [0.01]	-0.00 [0.01]	-0.00 [0.00]	0.02 [0.01]	0.02 [0.01]
high		0.05** [0.02]	-0.01 [0.01]	-0.01 [0.01]	0.04** [0.01]	0.04* [0.02]
Direct effects						
medium		0.14** [0.04]	0.11 [0.06]	-0.10 [0.10]	0.01 [0.03]	0.08 [0.06]
high		0.25*** [0.06]	0.22** [0.01]	-0.22** [0.08]	0.04 [0.04]	0.20* [0.08]
Total effects						
medium		0.20*** [0.04]	0.11 [0.06]	-0.10 [0.10]	0.03 [0.03]	0.09 [0.06]
high		0.30*** [0.06]	0.20** [0.10]	-0.22** [0.08]	0.10** [0.04]	0.24*** [0.08]
Control variables						
Age	-0.01 [0.00]	-0.05 [0.00]	0.00 [0.01]	0.02** [0.01]	-0.01*** [0.00]	-0.01** [0.01]
Sex	0.13 [0.05]	-0.13 [0.04]	0.02 [0.05]	0.05 [0.05]	-0.10*** [0.02]	0.01 [0.05]

Note: standard errors in parentheses; weighted data from NRW80+, Wave One with N=1,482
Significance levels: *** p<0.01, ** p<0.05, * p<0.1*

Table 25 GSEM for Figure 5, including education, internal control belief as a mediator, indicators of SLC, and the control variables age and sex

VARIABLES	Internal Control Belief	Functional Quality of Life (I)	Social Embed-dedness (II)	Anomy (III)	Valuation of Life (IV)	Positive Ageing Experience (V)
Mediator Internal Control Belief		0.34*** [0.03]	-0.02 [0.03]	-0.15*** [0.04]	-0.27*** [0.02]	0.27*** [0.02]
Independent Variable of Interest:						
Education (Ref. low)						
medium	0.20*** [0.05]					
high	0.31*** [0.07]					
Indirect effects						
medium		0.07* [0.02]	-0.00 [0.01]	-0.03* [0.01]	0.05** [0.02]	0.04** [0.01]
high		0.10***[0.03]	-0.01 [0.01]	-0.05** [0.02]	0.08*** [0.02]	0.06*** [0.02]
Direct effects						
medium		0.10* [0.04]	0.11 [0.06]	-0.07 [0.07]	-0.02 [0.03]	-0.02 [0.03]
high		0.19*** [0.05]	0.21** [0.10]	-0.18** [0.08]	0.01 [0.04]	-0.00 [0.04]
Total effects						
medium		0.16*** [0.04]	-0.03 [0.06]	-0.10 [0.07]	0.03 [0.03]	0.10 [0.06]
high		0.30*** [0.06]	0.20** [0.10]	-0.22** [0.08]	0.08** [0.04]	0.24*** [0.08]
Control variables						
Age		-0.04*** [0.00]	0.00 [0.01]	0.01 [0.01]	-0.00 [0.00]	-0.01 [0.01]
Sex		-0.11*** [0.04]	0.02 [0.05]	0.05 [0.05]	-0.06* [0.02]	0.03 [0.05]

Note: standard errors in parentheses; weighted data from NRW80+, Wave One with N=1,482
Significance levels: *** p<0.01, ** p<0.05, * p<0.1*

Table 26 Multivariate regression analyses on the degree of care as a further objective health indicator of SLC in comparison with subjective indicators

	Objective Indicators of SLC		*Subjective Indicators of SLC*			
VARIABLES	**Degree of Care (I)**	**Functional Quality of Life (II)**	**Frequency of Social Embeddedness (I)**	**Anomy (II)**	**Valuation of Life (III)**	**Positive Ageing Experience (IV)**
Education (Ref. low)						
medium	-0.35*** (0.10)	0.19*** (0.05)	-0.00 (0.06)	-0.07 (0.06)	0.03 (0.03)	0.10* (0.06)
high	-0.56*** (0.12)	0.32*** (0.06)	0.10 (0.09)	-0.18** (0.07)	0.11*** (0.04)	0.25*** (0.08)
Age	0.09*** (0.01)	-0.06*** (0.00)	0.01 (0.00)	0.02*** (0.01)	-0.02*** (0.00)	-0.02*** (0.01)
Sex (female)	0.03 (0.08)	-0.12*** (0.04)	0.02 (0.05)	0.06 (0.05)	-0.06** (0.03)	0.03 (0.05)
Constant	-6.61*** (0.78)	5.94*** (0.37)	1.41** (0.56)	1.13** (0.50)	3.33*** (0.26)	3.08*** (0.50)
Observations	1,638	1,638	1,638	1,638	1,638	1,638
R^2	0.11	0.17	0.00	0.02	0.06	0.02

Note: standard errors in parentheses; weighted data from NRW80+, W1 with N=1,638
Significance levels: *** p<0.01, ** p<0.05, * p<0.1*

5 Schlussfolgerungen

5.1 Übergreifende Interpretation der Ergebnisse

Die übergreifende Forschungsfrage dieser Arbeit stellt die (individuellen) Bedingungen, die Hochaltrigen ermöglichen gelingend zu altern, in den Mittelpunkt. Gesund zu bleiben, selbstständig zu leben und ein produktives Leben zu führen, bleiben für Hochaltrige sowie für jüngere Bevölkerungsgruppen wichtige Ziele (Ribeiro & Araújo 2019). Wesentliche Kriterien des von Rowe und Kahn (1997) vorgeschlagenen Konzepts erfolgreichen Alterns erscheinen für die Lebensphase der Hochaltrigkeit jedoch wenig angemessen, wenn mit Baltes (1999) davon ausgegangen wird, dass das vierte Lebensalter im Vergleich zum dritten Lebensalter nicht mehr primär durch Aktivität, Engagement und Gesundheit charakterisiert wird, sondern durch biologische und funktionale Abbauprozesse. Gleichzeitig ist bei der Gruppe der Hochaltrigen eine hohe Anpassungsfähigkeit zu beobachten, mit der sie beispielsweise diesen Abbauprozessen oder kritischen Lebensereignissen wie einer Verwitwung gegenübertritt (vgl. Kapitel 3). Für eine umfassende Bewertung erfolgreichen Alterns bei Hochaltrigen müssen daher einerseits die Schwellenwerte objektiver Kriterien an die Lebensrealität der Hochaltrigen angepasst werden, vor allem aber – wie etwa im CHAPO-Modell (Wagner et al. 2018b) – subjektive Kriterien der Bewertung der Lebensqualität im hohen Alter berücksichtigt werden. Außerdem müssen Kriterien für das produktive soziale Engagement wie die Erwerbstätigkeit oder das Ehrenamt ausgeklammert und je nach Lebensstilpräferenzen individuell angepasst werden.

Der Begriff des erfolgreichen Alterns hat sich als großer Diskurskatalysator für die Verbesserung der Lebensbedingungen und der Lebensqualität Hochaltriger herausgestellt. Die Verwendung eines einheitlichen Begriffs, sowie die damit einhergehenden einheitlichen Operationalisierungen erleichtern zudem die Vergleichbarkeit von internationalen Studien dieses Themenkomplexes. Allerdings empfiehlt sich – zumindest für die Diskussion in europäischen Kontexten – den Ausdruck des ‚gelingenden Alterns' zu verwenden, da dieser weniger stigmatisierend und normativ geprägt ist und vor allem nicht die Assoziation des Leistungsgedankens im hohen Alter anstößt. Daher überzeugt die Begrifflichkeit und das zugrunde liegende Konzept der ‚gelingenden (aktiven) Lebensführung' im CHAPO-Modell (Wagner et al. 2018b), wenn dabei stets die in 1.1.2.2 und 1.1.2.3 diskutierten Konzeptanpassungen an die Hochaltrigkeit einbezogen werden. In der dritten Teilstudie dieser Arbeit wird das Konzept der ‚gelingenden (aktiven) Lebensführung' als Alternativkonzept zum vielfach kritisierten klassischen Modell des erfolgreichen Alterns nach Rowe und Kahn verwendet. Hier lässt sich allerdings nach Gesamtbetrachtung der Arbeit anmerken, dass das Konzept der ‚gelingenden (aktiven) Lebensführung' im Verhältnis zu Rowe und Kahn's Definition des erfolgreichen Alterns komplementär betrachtet werden kann. Die Ergänzung besteht darin, dass die ‚gelin-

gende (aktive) Lebensführung‘ den Fokus auf die Merkmale der Hochaltrigkeit als Lebensphase setzt, subjektive Indikatoren enthält, sowie Interaktionen zwischen Individuen und ihrer Umwelt kontinuierlich abzubilden versucht. Dies bedeutet für das Konzept des erfolgreichen Alterns in der ursprünglichen Definition nach Rowe und Kahn, dass es aufgrund der Ergebnisse der empirischen Analysen für Hochaltrige und nach ihrer kritischen Begutachtung keinen besonderen Mehrwert zur ‚gelingenden (aktiven) Lebensführung‘ beiträgt. Somit eignen sich die Kriterien des Konzepts der ‚gelingenden (aktiven) Lebensführung‘ deutlich besser für die Untersuchung der Hochaltrigkeit (vgl. Kapitel 4), sodass die ursprünglichen Kriterien des erfolgreichen Alterns nach Rowe und Kahn’s Definition endgültig abgelöst werden können. Allerdings sollten zukünftige Modelle die Bedürfnisse der Hochaltrigen weiterhin im Sinne von Rowe und Kahns ressourcenorientierten Ansätzen untersuchen, da der Großteil der in dieser Arbeit untersuchten Hochaltrigen ihr Leben sehr positiv bewerten und diese wahrscheinlich aus ihren Ressourcen, wie beispielsweise Lebenserfahrung und einem hohen Adaptionsvermögen schöpfen.

Der rote Faden in den Ergebnissen dieser Dissertation liegt in unterschiedlichen Befunden zwischen Ausprägungen objektiver und subjektiver Kriterien und deren Determinanten. Diese Unterscheidung sollte – wenn möglich – in Forschungsarbeiten weiterhin berücksichtigt werden, wobei die subjektiven stärker als die objektiven Indikatoren ins Gewicht fallen sollten. Die drei durchgeführten Teilstudien lassen in Bezug auf den roten Faden zentrale Schlüsse zu, die im Folgenden in ihrem Zusammenwirken diskutiert werden.

Die Ausprägungen der objektiven und subjektiven Indikatoren des erfolgreichen Alterns bleiben über zwei Wellen des repräsentativen Datensatzes der Hochaltrigen stabil, wobei die Ausprägungen der subjektiven Kriterien im Durchschnitt sehr hoch ausfallen (vgl. Kapitel 3.3). Diese Beobachtung bestätigt das Paradoxon des subjektiven Wohlbefindens (Wettstein et al. 2015). Trotz Verlusterfahrungen, die mit dem Älterwerden und gesundheitlichen Einbußen verbunden sind, bleibt das subjektive psychische Wohlbefinden im Alter stabil (Jopp et al. 2008; Kunzmann et al. 2000). In der ersten Teilstudie tritt ebenfalls innerhalb des Querschnittes eine hohe Diskrepanz zwischen Ausprägungen der objektiven und subjektiven Indikatoren des erfolgreichen Alterns auf. Dieses Paradoxon zwischen objektiven und subjektiven Indikatoren des erfolgreichen Alterns könnte durch Ansätze zu den Anpassungsprozessen des Alterns erklärt werden, z.B. durch die Selektions-Optimierungs-Kompensations-Theorie nach Baltes und Carstensen (1996) oder das Zwei-Prozess-Modell nach Brandtstädter und Renner (1990).

In der zweiten Teilstudie nehmen das interpersonale soziale Engagement, die Lebenszufriedenheit und die aktive Verbundenheit mit dem Leben bei veränderten Lebenssituationen wie der Verwitwung signifikant ab. Hingegen nimmt das interpersonale soziale Engagement mit dem Umzug in eine Institution signifikant zu. Die unerwarteten Ergebnisse beim Umzug in eine institutionelle

Wohnform im Hinblick auf das interpersonale soziale Engagement (vgl. Kapitel 3) können ebenfalls anhand der hohen Anpassungsstrategien Hochaltriger erklärt werden. Es ist anzunehmen, dass sich die Heimbewohnenden aufgrund ihrer Anpassungsfähigkeit nach einer gewissen Zeit an die neue Wohnumgebung gewöhnen. Das Kennenlernen eines neuen sozialen Umfelds und der tägliche Kontakt zu professionellen Pflegekräften können hier förderlich sein. Trotz eingeschränkter körperlicher oder kognitiver Funktionen der Hochaltrigen sind Begegnungen in stationären Wohneinrichtungen vermutlich leichter umsetzbar als im privaten Wohnumfeld, was auch mit dem kleiner werdenden Bewegungsradius Hochaltriger zusammenhängen könnte. Das bedeutet, dass die Gestaltung sozialer Aktivitäten besonders in Pflegeheimen einen positiven Effekt auf das Wohlbefinden Hochaltriger haben kann und diese Aktivitäten daher auf die Bedürfnisse der Hochaltrigen hin angepasst werden sollten. Beim Befund des erhöhten interpersonalen sozialen Engagements der Heimbewohnenden muss allerdings neben der Quantität der sozialen Kontakte die Verbundenheit zu ihrem sozialen Umfeld untersucht werden.

Neben der zeitlichen Entwicklung der Ausprägungen objektiver und subjektiver Indikatoren des erfolgreichen Alterns interessiert in Kapitel 4 die genauere Betrachtung der Determinanten der ‚gelingenden (aktiven) Lebensführung' wie beispielsweise Bildung, die bereits in der ersten Teilstudie einen signifikanten Prädiktor aufweist. Anhand der Strukturgleichungsmodelle lässt sich zeigen, dass der Zusammenhang aus Bildung und der ‚gelingenden (aktiven) Lebensführung' durch Variablen wie Vermögen, Gesundheitskompetenz und internales Kontrollerleben teilweise mediiert wird, jedoch nicht mit substanzieller Größe. Allerdings scheint Vermögen im Gegensatz zur Gesundheitskompetenz und zum internalen Kontrollerleben eine bedeutsamere Rolle für die ‚gelingende (aktive) Lebensführung' zu spielen, was besonders im Hinblick auf soziale Ungleichheiten in der Gesellschaft kritisch zu hinterfragen ist. Denn einerseits kann Vermögen als Stabilisator wirken, besonders in einer sich schnell verändernden Gesellschaft, andererseits birgt Vermögen auch den Nachteil von wachsender Ungleichheit, da Vermögen sehr häufig vererbt wird. Des Weiteren beinhalten die Ergebnisse der Strukturgleichungsmodelle keinen allgemeinen Bildungsgradienten, es zeichnet sich allerdings für objektive Gesundheitsmarker wie der funktionalen Lebensqualität ein anderes Bild ab als für die subjektiven Indikatoren der ‚gelingenden (aktiven) Lebensführung'. Das bedeutet, dass die Rolle der Bildung für objektive Gesundheitsmarker relevant ist, jedoch weniger bis gar keine Rolle für die subjektiven Indikatoren spielt. Bildung, besonders ein hoher Bildungsgrad, ist somit eine wichtige Ressource, die über den Lebensverlauf geschützt und gefördert werden sollte. Weitere Ressourcen scheinen allerdings eine ebenso wichtige Rolle für die Erklärung unterschiedlich gelingend ausgeprägter Lebensführungen zu spielen.

5.2 Limitationen

Neben den Stärken der zur Verfügung stehenden NRW80+-Studie, die am Ende dieses Abschnittes zusammengefasst werden, gibt es ebenso Limitationen zu nennen. Die Ergebnisse bezüglich der Gruppe der Heimbewohner sind in den drei Teilstudien mit Vorsicht zu betrachten, da diese Gruppe nur einen kleinen Anteil der Stichprobe ausmacht. Zudem kann es bei der Verwendung der zwei Befragungswellen und in Bezug auf institutionalisiert Wohnende zu selektiven Dropouts kommen, die zu einer Selektionsverzerrung führen können. Dies bedeutet, dass Befunde zu institutionalisiert Wohnenden sowie Längsschnittbefunde im Allgemeinen vorsichtig interpretiert werden müssen (Wolke et al. 2009). Das Forschungsteam der NRW80+-Studie hat dazu ein umfassendes und sehr altersspezifisches Modell zur Vorhersage der Wahrscheinlichkeit einer erneuten Teilnahme geschätzt und diesen Faktor so weit wie möglich korrigiert. Darüber hinaus verringerte sich die effektive Stichprobengröße des Längsschnittdatensatzes (Wirksamkeit der Gewichtung = 64 %), was jedoch größtenteils darauf zurückzuführen ist, dass die Überstichprobe der ältesten Alten (90+) und der Männer kompensiert wurde (Brix et al. 2021). Daher scheinen die potenziellen Auswirkungen des selektiven Ausscheidens auf systematische Veränderungen der Indikatoren des erfolgreichen Alterns gering zu sein. Außerdem erklärt sich die Repräsentativität der Datensätze durch die Befragung von Heimbewohner:innen und Stellvertreter:inneninterviews für Personen, die nicht selbstständig teilnehmen können, und ist wesentlich höher als in vielen Studien ohne die Befragung dieser Altersgruppe.

Des Weiteren lassen sich mit den NRW80+-Datensätzen keine Mehrebenenanalysen durchführen, mit denen untersucht werden können, ob die Zugehörigkeit zu einem bestimmten institutionalisierten Wohnumfeld Indikatoren des erfolgreichen Alterns oder der ‚gelingenden (aktiven) Lebensführung' beeinflusst. Was die Befragten in institutionalisierten Wohnformen betrifft, so liegen ebenfalls keine Informationen über ihr Vermögen vor, was bedeutet, dass sie in den Ergebnissen der Strukturgleichungsmodelle weitgehend ausgeschlossen werden (vgl. Kapitel 4). Aufgrund der Verwendung von Stellvertreter:inneninterviews fehlen ebenfalls ausführliche Informationen zum kognitiven Zustand, da ein Demenz Screeningverfahren nur bei Zielpersonen angewendet werden kann (vgl. Kapitel 2 und 3). Solche systematischen Ausschlüsse wegen fehlender Werte bei ausgewählten Variablen können die empirischen Ergebnisse insbesondere zu den institutionalisiert Wohnenden und kognitiv beeinträchtigten Hochaltrigen verzerren. Diese systematisch fehlenden Werte lassen sich meistens nicht adäquat imputieren (vgl. Abschnitt 4.3.3). Es empfiehlt sich, Analysen mit einer höheren Anzahl an institutionalisiert Wohnenden durchzuführen und – wenn möglich – nur Variablen zu verwenden, die ebenfalls Informationen über diese Teilgruppe bereitstellen.

Bei der Untersuchung des erfolgreichen Alterns werden häufig Lebenslauferfahrungen ignoriert, die Vorteile oder Nachteile für die Hochaltrigen implizieren könnten. Die Lebensverlaufsperspekti-

ve konnte in den empirischen Analysen dieser Arbeit nicht berücksichtigt werden, da hierfür andere Konstrukte zur Messung biografischer Erfahrungen benötigt werden. Daher sind Längsschnittanalysen zu empfehlen, die diese Konstrukte einbeziehen. Da ohne Längsschnittdaten keine kausalen Schlussfolgerungen für die vorliegende Arbeit gezogen werden können, werden weitere Längsschnittdaten ebenso benötigt, um beispielsweise Cross-Lagged-Panel-Analysen zu berechnen sowie darüber die Dynamik der Beziehungen zwischen Bildung und der ‚gelingenden (aktiven) Lebensführung' in der dritten Teilstudie genauer zu durchdringen. Eine eigenständige längsschnittliche repräsentative Verfolgung über das Wohlbefinden der Hochaltrigen über den Deutschen Alterssurvey (DEAS) hinaus ist also in der Zukunft unbedingt erforderlich, um komplexe Zusammenhänge möglichst valide abbilden zu können.

Nichtsdestotrotz vermögen die Ergebnisse der vorliegenden Arbeit aufgrund folgender Punkte überzeugen: In Anbetracht des hohen Durchschnittsalters der NRW80+-Studie ist eine Rücklaufquote von 23 % als sehr gut zu bezeichnen, verglichen mit 27 %, die im Deutschen Alterssurvey erreicht wurden (Klaus et al. 2017). Da bisher keine Daten für Hochaltrige vorliegen, liefern diese Analysen einen wichtigen Beitrag, um Erkenntnisse über deren Lebensqualität zu gewinnen. Außerdem stellen die in dieser Arbeit verwendeten Daten im Quer- und Längsschnitt valide Momentaufnahmen des erfolgreichen/gelingenden Alterns Hochaltriger vor Beginn der COVID-19-Pandemie dar. Zusätzlich haben diese Daten den Vorteil eines einheitlichen Erhebungssettings.

5.3 Implikationen für die Forschung

Neben der quantitativen Überprüfung von Konzepten des erfolgreichen Alterns benötigt die zukünftige Forschung weitere qualitative Forschungsansätze, die untersuchen, wie Hochaltrige gelingendes Altern für sich persönlich definieren. Für die Untersuchung von Kontextfaktoren wie beispielsweise der Heimzugehörigkeit oder Lebensbedingungen in der Stadt gegenüber ländlichen Bedingungen, braucht es Datenstrukturen, die Mehrebenenanalysen über das gelingende Altern ermöglichen. Um die Ergebnisse aus der Analyse der Längsschnittdaten in der zweiten Teilstudie zu validieren, werden zusätzliche Befragungswellen benötigt, damit Fixed- sowie Random-Effects-Modelle angewendet werden können. Darüber hinaus wäre es für die zukünftige Forschung interessant, weitere Variablen aus dem früheren Lebensverlauf im Hinblick auf erfolgreiches Altern im hohen Alter zu untersuchen, was die Relevanz der längsschnittlichen Verfolgung von Individuen über den gesamten Lebensverlauf verdeutlicht.

Die Rolle von Adaptionsstrategien als Prädiktor oder Mediator für die ‚gelingende (aktive) Lebensführung' ist im hohen Alter empirisch nicht untersucht. Diese könnten besonders bei ungleichen Möglichkeiten gelingend zu altern, beispielsweise bedingt durch den Bildungsgrad, das Geschlecht, die Herkunft oder den Familienstand, eine zentrale Rolle spielen. Neben der bisherigen

Untersuchung von Bildungsungleichheiten (vgl. Kapitel 4) müssen demnach für Hochaltrige weitere Bedingungen potenzieller Alternsungleichheit untersucht werden.

Ein hoher Bildungsgrad ist eine wichtige Ressource über die Lebensspanne, die ungleiche Bedingungen beim Altern reduzieren kann. Mit dem zunehmenden Bildungsniveau der kommenden Generationen könnte Bildung eine bedeutsame Ressource für die ‚gelingende (aktive) Lebensführung' einnehmen. Insbesondere sind Gesundheitsmarker einer ‚gelingenden (aktiven) Lebensführung im Hinblick auf Bildungsungleichheiten in Zukunft weiter untersuchenswert. Subjektive Indikatoren scheinen eine weniger starke Rolle bei der Erklärung von Ungleichheit in der ‚gelingenden (aktiven) Lebensführung' zu spielen. Im Hinblick auf die Auswahl potenzieller Mediatoren wäre es interessant zu untersuchen, ob Resilienz- oder Anpassungsstrategien der Hochaltrigen den Effekt von Bildungsungleichheiten auf die ‚gelingende (aktive) Lebensführung' mediieren. Dies gilt insbesondere für die Anpassung an kritische Lebensereignisse wie beispielsweise den Verlust des Ehepartners bzw. der Ehepartnerin oder den Umzug in eine stationäre Pflegeeinrichtung, da diese in dieser Phase des Alterns häufiger auftreten.

Abschließend muss für die Messung und Interpretation zukünftiger Modelle des gelingenden Alterns bedacht werden, dass der Handlungsspielraum eines Individuums begrenzt ist. Daher müssen zukünftige Konzepte die gesellschaftlichen Strukturen, die Ungleichheiten beim Altern bewirken, kritisch diskutieren. Das bedeutet, dass die Umwelt im Hinblick auf ihre Opportunitätsstrukturen mindestens genauso stark wie die individuellen Möglichkeiten einbezogen werden muss. So lässt sich überlegen, ob einem Messmodell, welches das Individuum in Interaktion mit der Umwelt in den Fokus rückt, auch ein objektives Messmodell gegenübergestellt wird. Dieses könnte beispielsweise die Höhe von Sozialkosten für Hochaltrige oder die Anzahl Angehöriger mit Pflegetätigkeiten messen. Insbesondere belastende Pflegetätigkeiten von Angehörigen könnten einen Indikator für eine nicht gelungene Anpassung der Umwelt an ein Individuum abbilden. Die empirische Überprüfung solcher zusätzlichen Indikatoren könnte die Untersuchung der ‚gelingenden (aktiven) Lebensführung' bei Hochaltrigen bereichern.

5.4 Implikationen für die Praxis

Basierend auf den Ergebnissen dieser Arbeit können zielgruppenspezifisch erfolgversprechende Interventionsstrategien für eine ‚gelingende (aktive) Lebensführung' erarbeitet werden. So sollten beispielsweise Anpassungsmechanismen so früh wie möglich gestärkt werden, um diese Gruppe insbesondere bei kritischen Lebensereignissen zu schützen. Mehr Wissen über diese Strategien könnte in professionellen Beratungs- und Betreuungssettings für Hochaltrige oder deren Angehörige erarbeitet und geschult werden.

Eine praktische Konsequenz aus dieser Arbeit ist, dass lebenslange Bildung und die soziale Einbettung bei akut kritischen Lebenssituationen sowie darüber hinaus eine ‚gelingende (aktive) Lebensführung' im hohen Alter unterstützen können. Dies bedeutet, dass Bildungsungleichheiten so früh wie möglich im Lebensverlauf reduziert werden sollten und Hochaltrige ein stabil unterstützendes soziales Umfeld benötigen. Außerdem könnten auch Bildungsangebote gezielt für Hochaltrige stärker gesät werden, indem möglichst einfache Zugänge zu Bildungsplattformen geschaffen werden. Neben der Ressource der Bildung scheint Vermögen für Orientierung und Stabilisierung in einer sich schnell verändernden Gesellschaft bedeutsam zu sein, sodass in der Praxis notwendige Güter für einen *normalen* Lebensstandard nicht zu teuer werden dürfen. Zugleich ist in Zukunft sowohl in der Theorie als auch in der Praxis weiter zu eruieren, welche Ressourcen die Unterschiede in der ‚gelingenden (aktiven) Lebensführung' Hochaltriger vorhersagen und wie das Wissen über Ressourcen in die Praxis finden und umgesetzt werden kann.

Der gesellschaftliche Umgang mit dem Thema Alter(n) sowie vorherrschend negative Alter(n)sbilder über die Lebensphase der Hochaltrigkeit könnten sich auf Basis der insgesamt eher positiven empirischen Ergebnisse dieser Dissertation einem Wandel unterziehen. Demnach ist es aus gesellschaftlicher Perspektive wünschenswert, die Ressourcen der Hochaltrigen in den Blick zu nehmen und in der Praxis zu fördern, statt den Fokus auf ihre Defizite bei chronischen Erkrankungen oder bei der Inanspruchnahme von Pflege zu setzen.

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