Clinical Rehabilitation

Discussing factors associated with quality of life in cancer follow-up appointments: A preliminary test of a pragmatic model for clinical practice.

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Abstract

Objective: To perform a preliminary test of a practical, evidence-based model to enable discussions around quality of life-related concerns during cancer follow-up appointments.

Design: Cross-sectional study measuring quality of life, illness perceptions, emotional distress, fatigue, and subjective cognitive complaints.

Setting: Cancer outpatient follow-up clinics in four National Health Services in the United Kingdom.

Participants: Working age post-treatment cancer patients, treated with curative intent.

Interventions: Not applicable.

Main measures: European Organisation for the Research and Treatment of Cancer - Quality of Life Questionnaire-Core 30, Illness Perceptions Questionnaire-Revised, Hospital Anxiety and Depression Scale, Chalder Fatigue Scale, Cognitive Failures Questionnaire.

Results: Fifty seven cancer patients, with a mean age of 36 and on average 2.75 years post-treatment, returned the completed questionnaires. Anxiety partially mediated the association between subjective cognitive complaints and illness identity (60%) and timeline (25%). Cognitive complaints mediated the relationships between quality of life and anxiety (45%), depression (30%), and fatigue (62%). Depression mediated the relationships between quality of life and illness identity (48%) and timeline (40%).

Conclusions: Our study provides a preliminary test of an evidence-based model to help elicit quality of life-related concerns during cancer follow-up appointments. Illness perceptions are associated with quality of life through the mediation of other cancer-relevant factors. Discussing the type, origin, and expected duration of symptoms may elicit other concerns, such as emotional distress, fatigue, or cognitive complaints, which explained a significant amount of the relationship between illness perceptions and quality of life.

Keywords: Quality of life, Follow-up care, Illness perceptions, Cancer, Survivors.

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Discussing factors associated with quality of life in cancer follow-up appointments: A preliminary test of a pragmatic model for clinical practice.

Running head: Quality of life in cancer

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Introduction

Two million people are currently living with and beyond cancer in the United

Kingdom. Sixty-six percent are estimated to be education- and working-age adults, namely

teenagers, young, and middle-aged adults (1,2). After treatment, they undergo many years of

follow-up monitoring, which involves regular scheduled appointments. These appointments

have two roles – to identify any signs of recurrence or secondary cancers (through clinical

examinations, blood, and radiological reports), ensuring quick access to treatment, and to

identify and manage treatment-related physical and psychosocial effects (3,4).

To provide the greatest benefit for patients, the follow-up process should hence

appropriately elicit patients' concerns to enable clinicians to provide tailored support (5).

Several recommendations have been put forward to improve follow-up care (5), both in

terms of content (i.e. clinical examination/symptom monitoring) and structure of the

follow-up process (i.e. when/where it takes place) (3,6). In recent years there has been

a strong movement towards the inclusion of psychosocial and patient-reported

symptoms/concerns in the follow-up process, in addition to the monitoring and

management of clinician-observed physical effects (4,7). This has motivated national

initiatives and guidelines promoting the use of quality of life as a metric for the provision of

care that can enhance patients' well-being (8). However, quality of life is a highly multifaceted

construct, associated with a plethora of clinical and psychological factors (9). The

psychological factors most frequently cited as involved in cancer patients' quality of life are

emotional distress (10), fatigue (11), subjective cognitive complaints (12), and illness

perceptions (13). While we have evidence that cancer patients' quality of life suffers, and we

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have assessments available to measure potential factors (14), the applied value of this

knowledge is yet to be fully realised, to the detriment of patients and healthcare providers alike

(15–17). This may stem from a knowledge gap regarding the key factors to be

monitored and addressed in the time-limited and overloaded healthcare context.

We suggest that a validated theoretical model, such as the Common Sense Model of

Illness (18), could bridge the gap between what we know from research are patients' concerns

and actually addressing them in practice. To our knowledge, there are no other models that

have been tested that could comprehensively help elicit specific psychological concerns that

may be relevant to each persons' quality of life. Here we take a first step in testing such a

model. On the basis of the Common Sense Model of Illness, we assume that it is not

only the event itself (i.e. diagnosis, treatment, transition to follow-up), but the core

personal beliefs about the illness and related events (i.e. illness perceptions) that will

predict other outcomes such as quality of life. We hypothesise that illness perceptions

will be associated with quality of life either directly or through the mediation of other

highly cited factors - emotional distress, fatigue (11), and subjective cognitive

complaints (12). This theoretical model could provide a simplified and pragmatic

method to promote and improve consistency in monitoring and addressing, in a

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personalised manner, the psychological factors relevant to each patients' quality of life during follow-up.

Methods

Design

This cross-sectional observational study was approved by the National Research Ethics Service Committee North West – Greater Manchester North (11/NW/0185).

Participants

Patients were invited to the study by their clinical teams in four National Health Service Trusts in the United Kingdom, between 2011 and 2013. They were offered the opportunity to participate if aged 16 to 50 and between 6 months and 6 years post-treatment. Time limits ensured patients were well enough after treatment, but that participation was early enough for researchers to measure short to medium term influences of the cancer-related psychological factors on quality of life. Patients were included if they were diagnosed with a type of cancer highly prevalent in this age group (lymphoma, breast cancer, germ cell tumour, or sarcoma); were treated with curative intent; were in complete remission. Patients were excluded if: the malignancy was a relapse or secondary cancer; if they had a history of central nervous system disease, cranial irradiation, mental health problems, substance abuse; if they were not proficient in English.

Procedure

Consecutive patients were identified by their treatment team during their regular follow-up appointments. Upon confirmation of eligibility, the clinical team referred the patient to the study. Patients were offered a participant information sheet detailing the study and were given time to ask questions and consider participation. After obtaining written informed

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consent patients were offered an envelope containing the questionnaires described below, to

complete at home and mail back to the research team. Where participants did not return the

questionnaires, mail reminders were sent six months following the initial contact and at the end

of the project.

Instruments

Questionnaires were chosen based on their brevity, sensitivity, and recommendations

of use in current clinical research and practice (16). Quality of life was evaluated with the

European Organisation for the Research and Treatment of Cancer - Quality of Life

Questionnaire-C30 (19). The general version was used due to the mixed diagnoses in the

patient group. It contains several subscales, of which we focused on the two items of the global

quality of life scale. The minimum score is 0 and maximum 100, higher scores representing a

higher quality of life. Emotional distress was measured with the Hospital Anxiety and

Depression Scale, designed to identify anxiety and depression symptoms in clinical groups. It

consists of two 7-item subscales (anxiety and depression), each item being rated between 0 (not

at all) to 3 (very often). The minimum score is 0 and maximum is 21, with a possible case cut-

off score of 8+ for each scale (20). Fatigue was evaluated with the 11-item Chalder Fatigue

Scale (21), providing a continuous measure of fatigue ranging from 0-33, whereby higher

scores represent more fatigue. Subjective cognitive complaints were evaluated with the 25-item

Cognitive Failures Questionnaire (22)**,** measuring self-reported failures in memory, attention,

perception, and motor functioning. Items can be rated from 0 (never) to 4 (very often). The

total score is obtained by summing items and ranges between 0 and 100, with higher scores

representing more self-reported cognitive complaints. Illness perceptions were measured with

the Illness Perception Questionnaire-Revised (23). The questionnaire evaluates eight

dimensions of illness perceptions: illness identity (number of symptoms the patients

perceives as part of the illness), timeline (how long the patient believes the illness will

last), consequences (expected effects of the illness), personal control (the expectation

that the illness/symptoms can be controlled through one's behaviour), treatment

control (expectation that the illness/symptoms can be controlled by treatment), illness

coherence (whether patients believe they understand the diagnosis and treatment),

timeline-cyclical (belief regarding the predictability and stability of symptoms), and

emotional representation (emotions elicited by thinking about the illness). Apart from

the identity symptom checklist, all questions are rated on a 5-point Likert scale, high

scores being associated with a higher level of the illness perception defined by each

scale. Patients were asked to describe their illness perceptions during their post-treatment

phase of their cancer pathway.

Statistical analyses

Following descriptive analyses we evaluated the relationship between illness

perceptions, quality of life, and other factors (emotional distress, fatigue, subjective cognitive

complaints) in the patient sample. Bootstrapped correlations were initially explored between

the factors. Following this, we pursued the preliminary examination of our hypothesized model

(Figure 1), using the factors most highly correlated with quality of life, namely: anxiety,

depression, fatigue, illness identity and timeline. We explored the model through bootstrapped

mediation analyses using the SPSS PROCESS macro (24). Bootstrapping calculates the level of

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explained variances in a distribution-independent manner, by inferring properties about the

population based on the re-sampling of the observed data.

[Insert Figure 1 around here]

In two of the analyses the predictors were the dimensions of illness

perceptions most highly correlated with quality of life (identity and timeline), while the

outcomes were either quality of life or cognitive complaints, potentially mediated by

depression, anxiety, or fatigue. In the third analysis the predictors were, in turn,

depression, anxiety, or fatigue, the outcome was quality of life, potentially mediated by

cognitive complaints. Consistent with the steps suggested in classic mediation

analyses, we evaluated each model through three steps (25). In the first two steps we

explored whether the predictors correlated with the outcomes (direct effect or path c')

and the mediators (path a), and whether the mediators correlated with the outcomes

(path b). In the third step, we tested for the indirect effect and we evaluated whether

the direct effect (path c') is smaller than the indirect/mediated effect (path a*b). Finally,

we calculated the percentage of total effect (path c) accounted for by the indirect effect

(i.e. P_m= a*b/(a*b+c')). We present the coefficients, associated 95% confidence

intervals (95% CI) of each path, the effect size associated with the mediation (small if

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<.20, moderate if .21-.79, and large if >.80), and the percentage of total effect accounted

for by the mediator (P_m).

Results

Patient recruitment and characteristics

Figure 2 details the three year recruitment process that lead to the inclusion of 57

patients in the present study.

[Insert Figure 2 around here]

Participants were on average 35.3 years old (sd = 9.79), 31 were female (54.4%), 43

(75.4%) had a university degree, 13 (22.8%) college education, and one had finalised

secondary school, reflecting national trends for this age group (26). On average, patients

were 2.7 years post-treatment and their quality of life was on average 64 (sd=20.76), out of a

total possible of 100 (Table 1). Figure 3 in the Electronic Supplementary Material depicts the

spread of individual patient quality of life scores.

[Insert Table 1 around here]

Relationships between factors

Almost all variables correlated with quality of life (Table 2). The strongest (>.50)

negative correlations were found between quality of life, emotional distress, and cognitive

complaints. Quality of life correlated moderately (.30-.49) with fatigue, illness identity,

timeline, and consequences, but no other dimensions of illness perceptions. This suggests that

patients who are fatigued, distressed, attribute more of their ongoing post-treatment symptoms

to their diagnosis, and perceive that their illness is chronic with multiple consequences also

have a reduced quality of life. Only identity and timeline also had moderate to strong

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correlations with the other factors. Consequently, these two dimensions of illness perceptions

were included in further analyses. Cognitive complaints were strongly and significantly

correlated with distress and fatigue and showed a moderate relationship with timeline.

Depression was moderately and positively correlated with illness identity and moderately with

the perceived timeline.

[Insert Table 2 around here]

Mediation analyses

Before evaluating the relationship between quality of life and other factors, we first

tested whether emotional distress and fatigue mediated the relationship between illness

perceptions and cognitive complaints (Figure 1, Model 1). This was examined because

patients' beliefs of their illness may include both expected physical *and* cognitive symptoms.

There was a significant indirect effect of the identity dimension on cognitive

complaints, mediated by anxiety (.97, .19 to 2.31), while the direct effect was not

significant. Anxiety accounted for 60% of the total effect of identity on cognitive

complaints, suggesting anxiety partially mediates the relationship between illness

identity and cognitive complaints (Table 3). Similarly, there was a significant indirect

effect of timeline on cognitive complaints via the mediation of anxiety (.42, .04 to 1.12),

which accounted for 25% of the total effect. This suggests that a stronger attribution of

any ongoing symptoms to the cancer diagnosis/treatment and a longer perceived

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illness timeline are related to cognitive complaints when patients report higher levels of

anxiety (Figure 4, Supplementary Material).

Second, we explored whether the relationship of distress and fatigue with

quality of life was mediated by cognitive complaints (Figure 1, Model 2). Both aspects

of emotional distress had a significant direct effect on quality of life. Otherwise said,

higher levels of anxiety (-1.64, -2.86 to -.42) or depression (-2.56, -3.66 to -1.46) were

related to a poorer quality of life. However, there was also an indirect effect of

cognitive complaints, accounting for 45% and 30%, respectively, of the total effect of

these factors on quality of life. Fatigue was related to quality of life through the

mediation of cognitive complaints (-1.89, -3.22 to -.88), in the absence of a direct

effect. Cognitive complaints explained 62% of the total effect of fatigue on quality of

life. This indicated that both emotional distress and especially fatigue related to quality

of life when cognitive complaints were also reported (Figure 5, Supplementary

Material).

[Insert Table 3 around here]

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Finally, the last part of the model explored whether the identity and timeline

dimensions of illness perceptions were related to quality of life via distress and fatigue.

This step explored whether our hypothesized model (Figure 1, Model 3), which

suggested that the interpretation of an event may lead to higher levels of emotional

distress, is also related to cancer survivors' quality of life. There was a significant

indirect effect of identity on quality of life through the mediation of depression (-1.42, -

2.54 to -.61), accounting for 48% of the total effect. Depression also mediated the

relationship between timeline and quality of life (-.76, -1.51 to -.27), accounting for

40% of the total effect. In other words, working-age cancer survivors who attributed

ongoing symptoms to their cancer diagnosis and treatment had a poor quality of life

when also reporting depression symptoms (Figure 6, Supplementary Material).

To sum up, in working-age cancer survivors, quality of life is related to illness

perceptions, particularly the attribution of ongoing symptoms to their cancer and the

perceived timeline of the illness. However, this relationship is mediated by depression.

Emotional distress and fatigue are also related to quality of life when cognitive

complaints are reported. Furthermore, cognitive complaints mediate the relationship

between illness perceptions and quality of life. Hence, quality of life receives a double influence, via depression and cognitive complaints.

Discussion

The aim of the present study was to conduct a preliminary analysis of a model inspired by the validated Common Sense Model of Illness (18). We suggested that such a model would help healthcare professionals elicit discussions around factors that are of most relevance to individual cancer patients' quality of life during follow-up. We focused on working-age patients as this group is under-researched despite their increased survival rates (2,27,28) and the known role of frequently cited unmet needs in patients' poor quality of life and recovery (16,29). The model incorporated the factors which have been most frequently cited as key in patients' recovery following their diagnosis and treatment - illness perceptions, emotional distress, fatigue, and subjective cognitive complaints.

Consistent with the literature in cancer patients of all ages, diagnoses, and in a similar fashion to patients with chronic health conditions, the quality of life of our follow-up participants was only just above average. Not all frequently cited psychological factors that we included in our model had the same strong relationship to quality of life. Different aspects of illness perceptions have been shown to be associated with patients' distress, including consequences and emotional representations (13,23). In our sample, consistent with prior literature, dimensions of illness perceptions that correlated with emotional distress were identity, timeline, consequences, the timeline-cyclical dimension, and emotional representations (13). However, only the first two also correlated with all other factors and especially quality of life, therefore only identity and timeline were included in the model. These two aspects were associated with cognitive complaints through the mediation of anxiety. In other words, attribution of a higher number of symptoms to cancer and a belief that these may

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last a long time, was related to increased subjective cognitive complaints when patients also

reported anxiety. This could be a result of an expected, perceived, or an actual poorer

performance in daily activities due to a lower level of concentration or memory (30,31). Future

studies could explore this further.

We continued by investigating whether the relationship between emotional

distress/fatigue and quality of life changed with the inclusion of cognitive complaints.

Increased levels of distress and fatigue were significantly associated with a lower quality of life

when patients also perceived their cognitive abilities to be poorer, potentially adding to the

cluster of symptoms on which patients are focusing (31). Finally, the same dimensions of

illness perceptions were related to quality of life, mediated by depression. Patients who

perceived their illness to have a strong identity (i.e. multiple ongoing symptoms) or a longer

timeline might focus more on their physical symptoms and attribute them to the illness and

treatment, irrespective of whether they are related (31). The symptoms may be interpreted as an

ongoing chronic illness, being associated with a low mood and poorer quality of life.

This study has several limitations. Given its cross-sectional design we cannot draw

any causal inferences. However, our aim was to explore a novel preliminary integration of

evidence-based relevant factors into a simple, practical model. Following its definition here,

our preliminary study now motivates the exploration of this model in more complex

longitudinal studies. We chose to use the Common Sense Model of Illness framework while

relating it to the factors that are most commonly cited to be of concern for cancer patients'

quality of life and which are also recommended by current patient care guidelines (8,32). We

acknowledge, however, that other factors could be tested, such as those included in the Chronic

Care Model (33), or models including social determinants of health (34). Hence, while our

chosen psychological mediators explained a significant amount of the associations, other socio-

demographic (i.e. deprivation level (29)), clinical (i.e. treatment types, co-morbidities (7)), or

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service delivery factors (i.e. self-management support (3,4)) may still play a role. Additional research is warranted to determine which other type of factors within such other categories, may be most relevant to be discussed and addressed in clinical practice. Lastly, our study is based on a relatively small and clinically heterogeneous sample, potentially limiting the generalisability of findings. However, depending on local, national, and international guidelines, the structure of follow-up services (especially for people aged 16 to 39) tends to be multidisciplinary as they cater for heterogeneous clinical groups (27,28). Recruitment difficulties, highly prevalent in this age group (35), resulted in a lower recruitment rate than expected. We did achieve a complete questionnaire return rate, close to similar studies (36). However, we acknowledge that this model would now need to be further validated in larger samples.

It is paramount to ensure patients receive the care they need to enable them to return to normal activity following curative treatment. This is not only the case for cancer patients, but applies to all patients with chronic illnesses who are under the management of a healthcare service or multidisciplinary team. Patients diagnosed and undergoing management for other chronic illnesses, such as diabetes (37) or spinal cord injuries (38) also have a poor quality of life. But as for the case of cancer, depicted here, for other such illnesses there is still a large gap between the evidence of factors influencing quality of life and the means to tackle them in clinical practice. Illness perceptions have been shown to be predictive of coping and adjustment in most patients long-term illnesses (23), while emotional distress is an important predictor of well-being of in patients with cardiovascular disease (39). These needs will not be addressed comprehensively by clinical services without a simplified model of what could influence patients' quality of life. The model described here suggests that instead of simply discussing quality of life in a general sense, or inquiring about a multitude of factors, future studies could

test whether a clear communication around expected symptoms and their duration may be

closely related to the quality of life of patients who attend outpatient appointments for routine

illness management.

Clinical Message

- A pragmatic model to discuss quality of life in time-strained clinical appointments is needed

- Illness perceptions such as the identity and duration of the illness are closely related to quality of life

- This relationship is mediated by patients' emotional distress, fatigue, and subjective cognitive complaints.

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Illustrations

Tables

		Mean (SD)	Observed range	Possible range
Patient characteristics	**Age**	36.7 (9.01)	19-50	-
	Sex	Female=31 Male=26	-	-
	Education	Secondary =1 College = 13 University = 43	-	-
	Years since treatment	2.75 (1.87)	-	-
IPQ-R	**Identity**	6.18 (3.33)	0-12	0-14
	Timeline (Acute/Chronic)	17.41 (4.29)	5-28	0-30
	Consequences	31.09 (5.28)	8-30	0-30
	Personal control	19.18 (4.81)	8-30	0-30
	Treatment control	18.47 (3.59)	6-25	0-25
	Coherence	19.27 (3.83)	9-25	0-25
	Timeline cyclical	11.99 (3.67)	4-21	0-30
	Emotional representation	18.9 (5.62)	6-30	0-30

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EORTC – QLQ-C30	Quality of life (Global health status)	64.26 (20.76)	16-100	0-100
CFQ	Cognitive complaints	46.78 (18.21)	7-87	0-100
CFS	Fatigue	16.35 (3.35)	8-26	0-33
HADS	Anxiety	8.62 (3.85)	0-21	0-21
	Depression	4.84 (4.01)	0-20	0-21

Table 1. Descriptive data for all sociodemographic patient characteristics, and variables included in analyses. Abbreviations: IPQ – Illness Perceptions Questionnaire – Revised; EORTC – QLQ-C30 – European Organisation for the Research and Treatment of Cancer – Quality of Life Questionnaire – Core 30; CFQ- Cognitive Failures Questionnaire; CFS – Chalder Fatigue Scale; HADS – Hospital Anxiety and Depression Scale; SD – standard deviation.

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	SCC	Fatigue	Anxiety	Depression	ID	Time	Conseq	Personal Ctrl	Treat Ctrl	Coherence	Cycle	Emotion
QoL	-.66**	-.49**	-.61**	-.71**	-.45**	-.39*	-.32*	.09	.16	.22	-.26	-.30
SCC		.56**	.62**	.56**	.29*	.38**	.24	-.20	-.23	-.05	.18	.22
Fatigue			.53**	.58**	.33*	.36**	.15	.04	-.03	-.002	.15	.30*
Anxiety				.67**	.44**	.26	.29*	-.26*	-.22	-.19	.44**	.58**
Depression					.49**	.32**	.32*	-.19	-.16	-.10	.26*	.39*
ID						.34*	.07	-.28*	-.27*	-.33*	.08	.11
Time							.28*	-.03	.02	.004	.09	.23
Conseq								-.30*	.02	-.03	.67**	.59**
Personal Ctrl									.51**	.25	-.13	-.19
Treat Ctrl										.44*	-.03	.07
Coherence											-.22	-.15
Cycle												.69**

Table 2. Bootstrapped correlations between quality of life (QoL, EORTC Quality of Life Questionnaire, global health status score), emotional

distress (anxiety and depression, Hospital Anxiety and Depression Scale), fatigue (Chalder Fatigue Scale), subjective cognitive complaints

(SCC, Cognitive Failures Questionnaire) and dimensions of illness perceptions (Illness Perceptions Questionnaire-Revised) – identity (ID),

timeline of illness (Time), consequences of illness (Conseq), Personal control over illness (Personal Ctrl), Treatment control (Treat Ctrl),

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Coherence, Timeline Cyclical (Cycle), and Emotional representation of illness (Emotion). **Bold:** moderate (.30-.49) and large (>.50) correlations

between factors. Light grey: factors included in mediation analyses. *p<.05, **p<.01, ***p<.001.

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Relationship	a (p) [95%CI]	b (p) [95%CI]	Direct pathway c' (p) [95%CI]	Total effect c (p) [95%CI]	Indirect pathway a*b [95%CI]	Effect size [95% CI]	P_m (%)
Model/Mediation 1: IPs (Identity/Timeline) - Emotional distress (Anxiety/Depression)/Fatigue-SCC							
Identity-Anxiety-SCC	**0.57 (.0004) [.27 to .88]**	**1.69 (.008) [.46 to 2.92]**			**.97 [.19 to 2.31]**	**.18 [.04 to .42]**	**60%**
Identity - Depression - SCC	*.59 (.0001)[.31 to .88]*	.78 (.26) [-.59 to 2.17]	-.34 (.60) [-1.62 to .95]	**1.60 (0.03) [.19 to 3.01]**	.47 [-.21 to 1.13]	.08 [-.04 to .21]	29%
Identity-Fatigue-SCC	*.34 (.009) [.08 to .59]*	*1.46 (.04) [.07 to 2.84]*			.49 [-.009 to 1.20]	.09 [-.002 to .21]	30%
Timeline-Anxiety-SCC	**.26 (.05) [-.003 to .52]**	**1.64 (.008) [.44 to 2.84]**			**.42 [.04 to 1.12]**	**.09 [.009 to .24]**	**25%**
Timeline-Depression-SCC	*.30 (.01) [.06 to .55]*	.57 (.39) [-.76 to 1.89]	.71 (.13) [-.22 to 1.65]	**1.65 (.003) [.58 to 2.72]**	.17 [-.18 to .51]	.04 [-.04 to .11]	10%
Timeline-Fatigue-SCC	*.28 (.005) [.09 to .49]*	1.21 (.09) [-.19 to 2.62]			.35 [-.05 to .80]	.08 [-.01 to .20]	21%

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Model/Mediation 2: Emotional distress (Anxiety/Depression)/Fatigue - SCC - QoL							
Anxiety - SCC - QoL	**2.7 (<.0001) [1.79 to 3.6]**	**-.50 (.0008) [-.79 to -.22]**	**-1.64 (.009) [-2.86 to -.42]**	**-3.00 (<.0001) [-4.05 to -1.95]**	**-1.36 [-2.29 to -.57]**	**-.27 [-.46 to -.12]**	**45%**
Depression - SCC - QoL	**2.58 (<.0001) [1.57 to 3.59]**	**-.42 (.0009) [-.66 to -.18]**	**-2.56 (<.0001) [-3.66 to -1.46]**	**-3.65 (<.0001) [-4.64 to -2.66]**	**-1.09 [-1.96 to -.46]**	**-.21 [-.35 to -.09]**	**30%**
Fatigue - SCC - QoL	**3.05 (<.0001) [1.83 to 4.26]**	**-.62 (<.0001) [-.89 to -.34]**	-1.18 (.12) [-2.69 to .32]	**-3.07 (.0001) [-4.53 to -1.62]**	**-1.89 [-3.22 to -.88]**	**-.30 [-.51 to -.14]**	**62%**
Model/Mediation 3: IPs (Identity/Timeline) - Emotional distress (Anxiety/Depression)/Fatigue - QoL							
Identity - Anxiety - QoL	*.57 (.0004) [.27 to .88]*	-.97 (.14) [-2.28 to .323]			-.56 [-1.42 to .22]	-.09 [-.22 to .04]	19%
Identity - Depression - QoL	***.59 (.0001) [.31 to .88]***	***-2.38 (.002) [-3.84 to -.92]***	-.83 (.22) [-2.19 to .53]	***-2.97 (.0002) [-4.44 to -1.49]***	**-1.42 [-2.54 to -.61]**	**-.23 [-.39 to -.10]**	**48%**
Identity - Fatigue - QoL	*.34 (.009) [.09 to .59]*	-.46 (.53) [-1.93 to 1.01]			-.15 [-.73 to .26]	-.02 [-.11 to .04]	5%
Timeline - Anxiety -	.26 (.05) [-.003 to	-1.06 (.09) [-2.30	**-.81 (.09) [-1.77**	**-1.88 (.002) [-3.07**	-.27 [-.77 to .09]	-.05 [-.15 to .02]	14%

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QoL	.52]	to .18]	to .14]	to -.69]			
Timeline - Depression- QoL	**.30 (.01) [.06 to .54]**	**-2.49 (.0006) [-3.86 to -1.12]**			**-.76 [-1.51 to -.27]**	**-.16 [-.29 to -.06]**	**40%**
Timeline - Fatigue - QoL	*.28 (.005) [.09 to .49]*	-.12 (.87) [-1.58 to 1.33]			-.03 [-.50 to .43]	-.007 [-.11 to .09]	1%

Table 3. Preliminary analysis of a practical model that includes three mediation analyses describing the relationships between illness perceptions, quality of life and four potential mediators – anxiety, depression, fatigue, and subjective cognitive complaints. Abbreviations and measures: QoL – quality of life, EORTC Quality of Life Questionnaire; Fatigue – Chalder Fatigue Scale; Anxiety and Depression – Hospital Anxiety and Depression Scale; SCC – subjective cognitive complaints, Cognitive Failures Questionnaire; IPs – illness perceptions (Illness Perceptions Questionnaire – Revised). **In bold:** statistically significant pathways suggesting mediation. *In italics:* statistically significant pathways *not* associated with mediation.
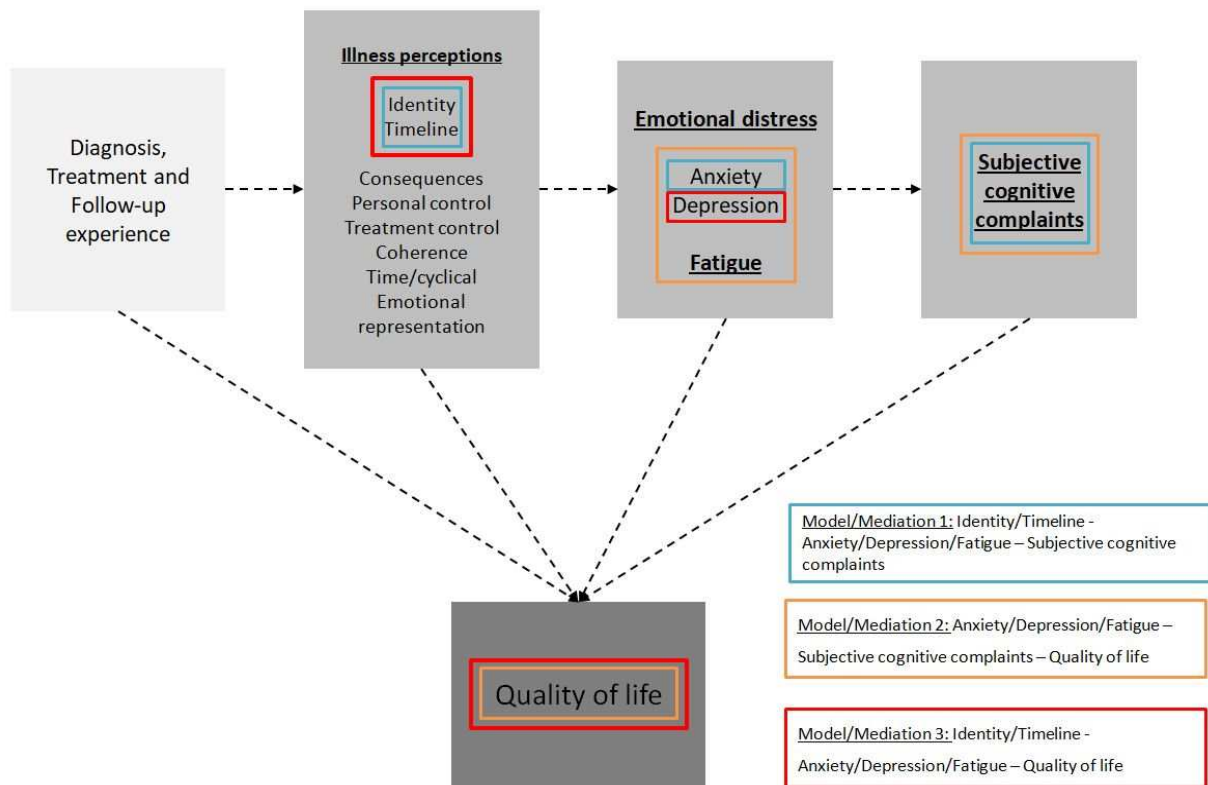
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Figures

Figure 1. Hypothesized model for the relationship between illness perceptions, emotional

distress, fatigue, subjective cognitive complaints, and quality of life. The model was tested

through three mediation analyses focusing on the relationship between illness perceptions and

subjective cognitive complaints (blue); distress/fatigue and quality of life (orange), and
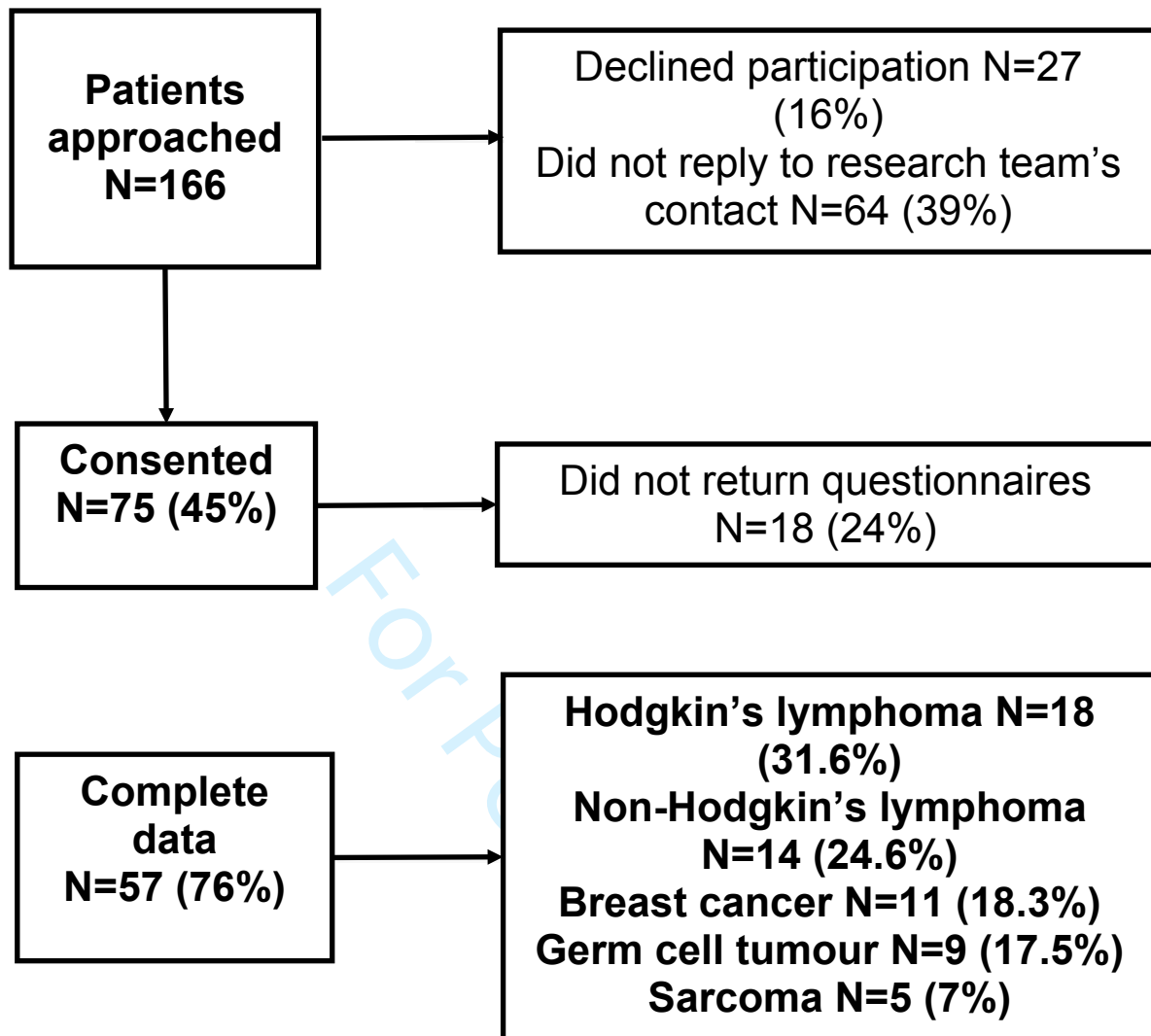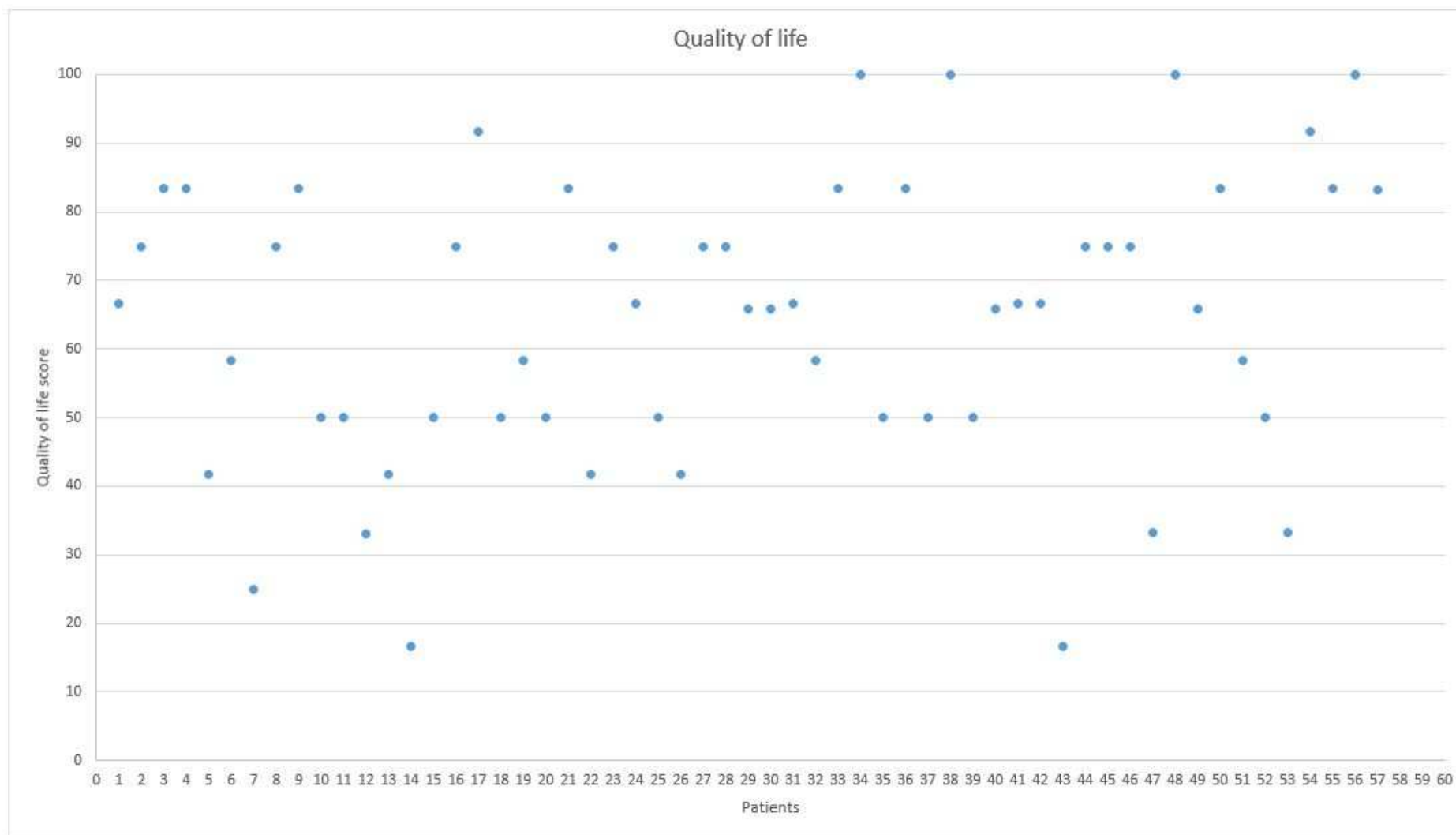
illness perceptions and quality of life (red).

Figure 2. Recruitment process leading to the inclusion of 57 post-treatment cancer patients in the study

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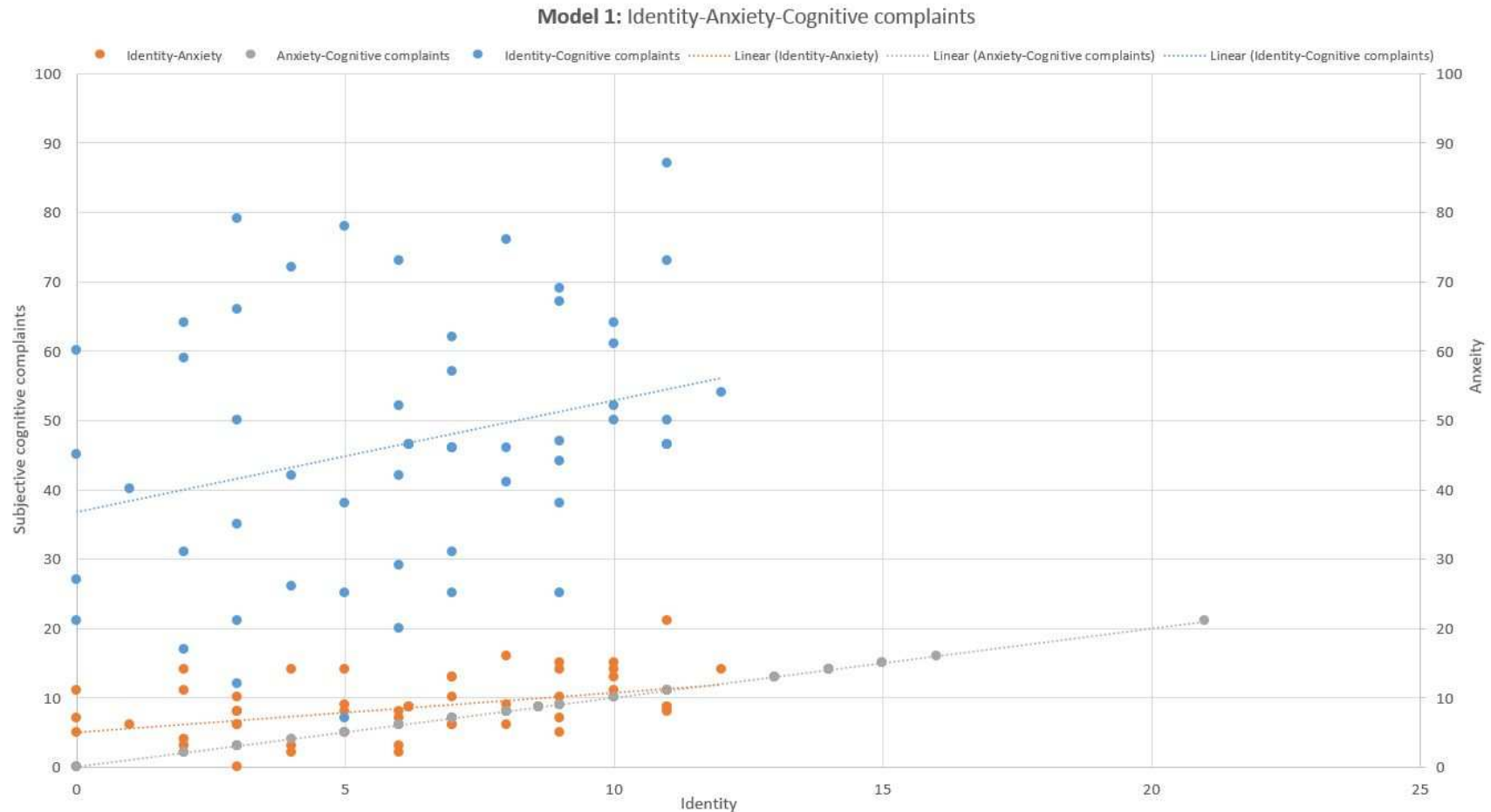28
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Quality of life

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Figure 3. Scatterplot depicting individual quality of life scores for the participants included in the study.

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Figure 4. Graphical depiction of one of the relationships in Model/Mediation 1 - Identity, Anxiety, and Subjective cognitive

complaints. The scatterplot depicts patient-level relationships between each 2 factors. As the identity of the illness increases,

reports of cognitive complaints increase (blue). This relationship is paralleled by an increase in illness identity (orange) and

cognitive complaints (grey) as anxiety increases. In our model anxiety accounted for 60% of the relationship between illness identity
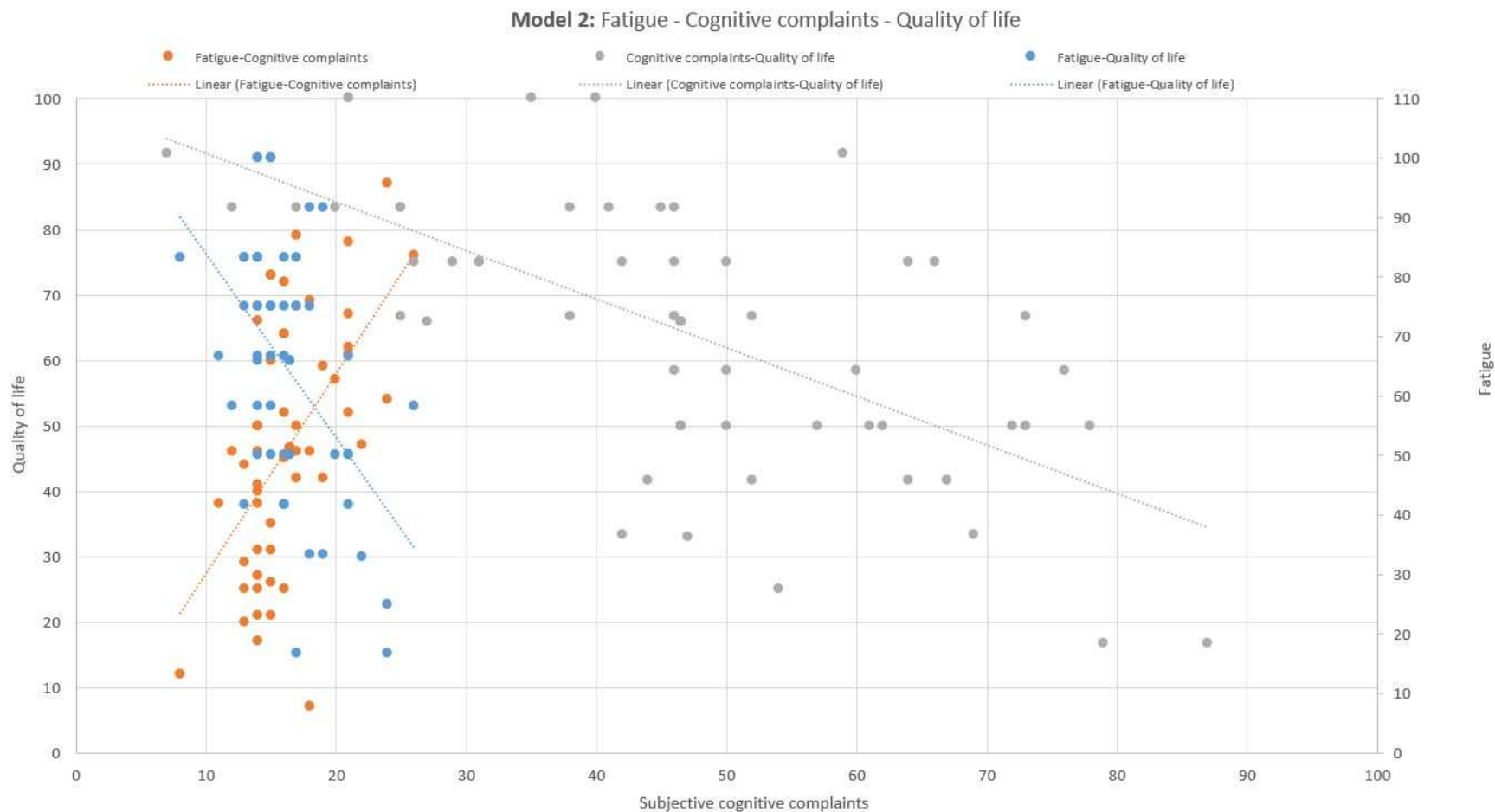
and cognitive complaints.

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Figure 5. Graphical depiction of one of the relationships in Model/Mediation 2 – Fatigue, Subjective cognitive complaints, and

quality of life. The scatterplot depicts patient-level relationships between each 2 factors. As fatigue increases, quality of life

decreases (blue). As subjective cognitive complaints increase, fatigue increases (orange); quality of life decreases as cognitive

complaints increase (grey). In our model subjective cognitive complaints accounted for 62% of the relationship between fatigue and
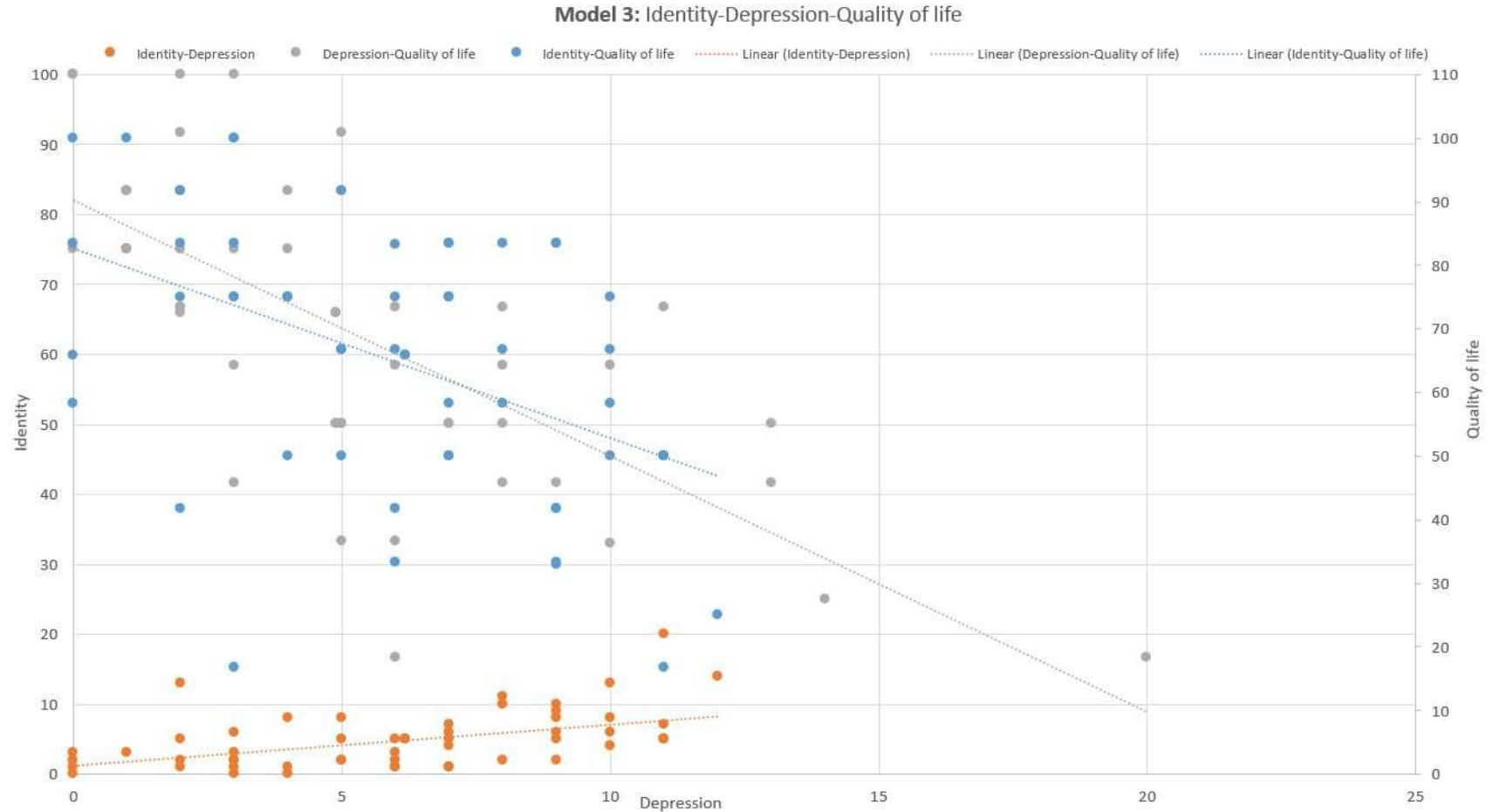
quality of life.

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Figure 6. Graphical depiction of one of the factor relationships in Model/Mediation 3 - Identity, Depression, Quality of life. The

scatterplot depicts patient-level relationships between each 2 factors. As the illness identity increases, quality of life decreases

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(blue). As illness identity increases, depression also increases (orange). As depression increases, quality of life decreases (grey).

In our model anxiety accounted for 48% of the relationship between identity and quality of life.

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